CONTENTS OF VOL III. 1888.

No. 4.

JOURNAL

OF THE

BOMBAY

Natural History Society

No. 4.] BOMBAY, DECEMBER, 1888. [Vol. III.

NESTING IN WESTERN INDIA.

By Lieut. H. E. Barnes.

Works on Indian Oology are very few, and many years have elapsed since the last was written. Colonel Marshall's book, "*Birds Nesting in India*," was published in 1877, and although most invaluable to collectors, does not describe fully either nests or eggs, and contains but few references to this side of India. Mr. Hume's splendid work, "*Nests and Eggs of Indian Birds*," was published in 1873, and has long been out of print. It describes in the most careful manner, both nests and eggs, of all birds known to breed in India at that time, and gives the fullest information regarding both localities and dates, but here again the references to Western India are few and incomplete. I believe that at one time Mr. Hume contemplated publishing a new and revised edition; indeed, Colonel Marshall in the preface to his work mentions having been allowed to take extracts from the manuscripts, which must at that time have been in an advanced stage. Mr. Hume having now presented his collection to the British Museum, and his time being fully taken up with another and perhaps more important subject, renders it extremely unlikely that this work will ever be published; this is to be the more regretted as it would have contained much matter especially interesting to Western Indian ornithologists. A great deal of information is contained in the *Bombay Gazetteer*, and many valuable notes are to

be found in the pages of *Stray Feathers* and other publications, not available to the general public.

The object of this paper is to collect together, in as concise a form as possible, all information available on the subject, in the hope that it will prove useful to those interested, and form a nucleus round which collectors will record their observations, and thus lead to a more complete knowledge of bird-life in Western India.

2.—THE INDIAN KING VULTURE.

Otogyps calvus, Scop.

The Indian King Vulture is more or less common throughout the district; unlike most Indian vultures, they are solitary in their habits, rarely more than two or three being seen together, the third one when present being a bird of the year which has not yet learned to forage for itself.

They are of a very quarrelsome disposition, particularly when feeding, not allowing any other creature to approach until they have satisfied their hunger.

They breed later than most of the other vultures; the middle of January being quite early enough to search for nests, which are few and far between, and long distances have to be gone over before much success can be looked for.

In some parts of the country, the birds make their nests in the tops of dense thorny bushes, about ten or twelve feet from the ground, but generally they are built on lofty trees; in the latter case the nest is of the usual platform type, but in the former they are cup-shaped.

The egg, there is only one, is very pale greenish-white in colour when first laid, but as incubation proceeds, it becomes much discoloured from the droppings of the parent birds; it is moderately fine in texture, and the lining is green: they vary in shape from a long oval to one nearly spherical, but broad ovals predominate. They measure 3·4 inches in length by about 2·6 in breadth.

Sholapur, 26th December to 1st February.	*J. Davidson, C.S.*
Nassick, 30th January to 1st March.	,,
Deesa, 14th September to 28th February.	*H. E. Barnes.*
Neemuch, 13th February to 1st March.	,,
Hydrabad, Sind, 14th March (nestling).	,,
Eastern Narra, Sind, 15th February to 15th April.	*S. Doig, Esq.*
Baroda, 15th April (nestling).	*H. Littledale, Esq.*

3 *bis*—THE BAY VULTURE.

Gyps fulvescens, Hume.

The Bay Vulture occurs not uncommonly in the northern portion of the district, where it is a permanent resident, breeding during the months of January and February, making a huge platform stick nest, on a lofty tree, and laying a single white egg, which is larger than that of either the King or the White-backed Vultures.

Baroda, 13th to 20th February, mostly young. H. Littledale, Esq.

4 *bis*—THE COMMON CLIFF VULTURE.

Gyps pallescens, Hume.

The Common Cliff Vulture occurs throughout the greater portion of the district, but has not as yet been recorded from Sind. They are permanent residents, but retire to the nearest suitable hills to breed during the cold season. They place their nests on ledges in the faces of almost inaccessible cliff; they are both difficult and dangerous to get at, as in most cases a man has to be drawn up from below, or let down from above. The nests, although so hard to get at, are easily found, owing to the conspicuous patches of white on the cliffs near them; these patches are the accumulated droppings of the birds. The nest is a mere collection of grass or sticks; the egg, there is only one, is usually a lougish oval in shape, and is dingy unspotted greyish-white in color, but is occasionally spotted with pale rusty-red and faint purplish-brown. They vary enormously in size, but the average is 3·61 inches in length by about 2·71 in breadth.

It is only of late years that this Vulture has been discriminated, it having formerly been confounded with the long-billed Brown Vulture, *Gyps indicus, Scop.*, from which it differs in many respects. *Khandesh, 23rd December to 5th January (inc. eggs and nestlings).*

J. Davidson, C.S.

Nassick, 30th December „ „ „
Aboo, 27th December. *H. E. Barnes.*

5.—THE WHITE-BACKED VULTURE.

Pseudogyps bengalensis, Gm.

The White-backed is the commonest of our Indian vultures, breeding in all parts of the country, from early in October to about the middle of December. They breed on loftly trees, in

colonies, sometimes as many as twenty nests being found on a single tree; these nests are placed at various heights, some being not more than ten or twelve feet from the ground, whilst others are placed near the top, each branch of any size being crowned with a nest. They never lay more than one egg, and this is somewhat smaller than that of the King Vulture, measuring about 3·25 inches in length by nearly 2·4 in breadth.

It is rather course in texture, and the lining is deep green. Some eggs are unspotted greyish-white, but many of them are sparingly and faintly blotched with reddish-brown. Like most vulture eggs they are generally discoloured by the droppings of the parent birds.

Panch Mahals, 12th to 24th November. *J. Davidson, C.S.*
Nassick, 25th November. ,,
Deesa, 25th December to 19th February (young). *H. E. Barnes.*
Neemuch, 9th November to 2nd December (inc. eggs). ,,
Hydrabad, Sind, 4th to 10th December ,,
Eastern Narra, Sind, 15th Nov. to 15th December. *S. Doig, Esq.*
Baroda, 25th November to 20th February. *H. Littledale, Esq.*

6.—THE SCAVENGER VULTURE.

Neophron ginginianus, Lath.

The White or Scavenger Vulture is common throughout Western India, frequenting the neighbourhood of villages in preference to less populous places, for reasons indicated by its name. They breed from early in March to the end of April; the nests are solitary, and are found in various situations,—the cornices of buildings, ledges in the faces of rocky or clayey cliffs, and more commonly on trees; when in the latter situation, it is not usually placed in a fork, but is built on a large horizontal branch at its junction with the trunk. Mr. Littledale says, "they never breed on trees in Sind" (this is quite in accordance with my own experience); about Baroda always on trees; in hilly jungles on cliffs by preference. About Neemuch they always build on trees.

The nest is a large, loose untidy affair, often lined with rags. The eggs, two in number, are broadish oval in shape, of a greyish-white ground colour, beautifully streaked and blotched with deep reddish-brown; some of them are so richly marked as to leave little or none of the ground colour visible, whilst others are

comparatively plain, and occasionally even a dingy white. They vary greatly in size, but average 2·62 inches in length by about 1·96 in breadth.

Many naturalists prefer to consider this vulture as a variety, or at most a sub-species of the Egyptian vulture, *Neophron percnopterus*, Lin. This latter breeds at Chaman, South Afghanistan.

The eggs are considerably larger but less highly coloured than those of the Indian bird.

Eastern Narra, Sind, March and April.	*S. Doig, Esq.*
Hydrabad, Sind, 22nd March to 22nd April.	*H. E. Barnes.*
Deesa, 20th March to 15th April.	,,
Neemuch, 18th March to 29th April.	,,
Panch Mahals, 9th March.	*J. Davidson, C. S.*
Khandesh, 2nd March.	,,
Nassick, 2nd to 22nd March.	,,
Baroda, 3rd to 17th March.	*H. Littledale, Esq.*

9.—THE SHAHIN.

Falco peregrinator, Sund.

The Shahin is the least common of our resident falcons, but it occurs in suitable localities throught the region, its favourite resort being the neighbourhood of high rocky hills, where it breeds, choosing a whole in the face of au almost inaccessible cliff. I have never been able to secure an egg, but I saw a pair making preparations for breeding near the waterfall at Patelpani, close to Mhow, the very same place where, years ago, Jerdon found an eyrie. Colonel Butler reports another eyrie at Khandala, and Mr. Davidson, C. S., West Khandesh, found a nest containing three fully fledged young ones in May, so that most probably the eggs were laid in March or early in April. He has also seen an eyrie at Matheran. The egg is said to resemble that of the Lagger Falcon, but to be somewhat narrower and not so highly coloured, but as the description was admittedly taken from a single egg it may not hold good in all cases.

They are great game destroyers.

11.—THE LAGGAR FALCON.

Falco jugger, J. E. Gr.

The Laggar is our commonest falcon, being generally distributed throughout the entire district; they nest indifferently on trees, on

edges in the faces of cliffs, cornices of buildings, &c. In the first case, they usually appropriate the deserted nest of a Tawny Eagle lor other bird. Most of them lay in the latter half of January and in February, but eggs are occasionally found in March. The nest is composed of small sticks and twigs; the eggs, four in number, are nearly perfect ovals in shape, somewhat chalky in texture, and are of a dingy yellowish-brown colour, clouded, mottled, and blotched with reddish-brown. When first taken they are often highly coloured, but if exposed to light soon fade. They average rather more than two inches in length by about 1·57 in breadth.

Sholapur, 4th January to 9th March.	*J. Davidson, C.S.*
Khandesh, 22nd January.	,,
Neemuch, 30th January to 27th February.	*H. E. Barnes.*
Hydrabad, Sind, 12th February to 15th March.	,,
Poona, 6th May (fledged nestlings).	,,
E. Narra, Sind, 10th to 15th February.	*S. Doig, Esq.*

16.—THE RED-HEADED MERLIN.

Falco chiquera, Daud.

The Turumti or red-headed Merlin is common throughout the district, frequenting open country in the neighbourhood of cultivation, preying chiefly on small birds and mice. It breeds during February and March, making its nest in a fork near the top of a densely foliaged tree; it is cup-shaped, neatly, and compactly made, and is composed of sticks and twigs lined with grass roots. The eggs, four in number, are not unlike those of the Lagger Falcon, but are of course, much smaller. Some of them are dingy yellowish-brown in colour, spotted and freckled with darker brown, but often they are of a deep red colour; these last are very beautiful. They average 1·66 inches in length by rather more than 1·26 in breadth. The nest would often remain undiscovered were it not that the birds are so noisy and pugnacious during the breeding season, sallying out and attacking any bird approaching the nest, no matter how large, not hesitating even to attack a Tawny Eagle, should one intrude.

Sholapur, 27th February to 1st March.	*J. Davidson, C.S.*
Khandesh, 14th February.	,,
Nassick, 15th February to 29th March.	,,
Deesa, 2nd March to 3rd April (inc. eggs).	*H. E. Barnes.*
Hydrabad, Sind, 15th March.	,,
Eastern Narra, Sind, 16th April.	*S. Doig, Esq.*

17.—THE KESTREL.

Cerchneis tinnunculus, Lin.

Most of the Kestrels found in Western India are cold weather visitants only, retiring to the mountain ranges to breed, many of them leaving the country altogether for this purpose. They are known to breed on the Nilgiris, and Mr. Davidson, C.S., found nests containing young in May on the Ghats in the Nassick district. I am indebted to him for the following interesting note :—"This is, as a "rule, a migrant, but a fair number breed all along the ghats in the "Nassick district. I have never taken the eggs, but I have shot the "young on the sides of the cliffs while unable to fly. They breed in "holes in the cliffs, and as there are a great many holes equally "suitable, the nests are hard to find. To get at them one party has "to stay below the cliffs, probably 200 feet from the top, and "another with a rope ladder above. As the holes in which the bird "nests are very deep and often 100 feet from the top, it is simply "luck to find the right one, and one in a position that the man let "down the cliff can reach."

They breed very commonly in the Bolan Pass and on the Khoja Amran Mountains in Southern Afghanistan.

At this latter place I found many nests. The nest is generally on a ledge or in a hole in the face of a cliff, but I once took four eggs from a nest that originally belonged to a common magpie.

The nest is of no particular shape, often taking the form of the place in which it is built; it is composed of small twigs, and all those that I have seen have been unlined. The eggs, four in number, rarely five, are broad ovals in shape, somewhat compressed at one end. The colour varies from light to dark brick or blood-red, mottled, blotched, and freckled with darker shades of the same colour, but yellowish-brown varieties also occur. They measure 1·58 inches in length by about 1·2 in breadth.

Chaman. *H. E. Barnes.*

Nassick, May. Nestlings. *J. Davidson, C.S.*

23.—THE SHIKRA.

Astur badius, Gm.

Of the many hawks that occur in India, the Shikra is perhaps the commonest, and is the only one that is known to breed in our

district, though most probably one or two of the others do so on the higher mountain ranges.

The Shikra breeds during April and May, making a shallow cup-shaped nest, rather smaller than that of the Turmuti, and not so neatly or so compactly built; like the latter it is composed of sticks and twigs, lined with grass-roots; it takes them a very long time to build it.

The eggs, three or four in number, are oval in shape, and measure 1·54 inches in length by about 1·23 in breadth. In colour, they are pale, glossless, bluish-white, unmarked, as a rule, very rarely with a few pale brown blotches.

Neemuch, 2nd to 30th April. *H. E. Barnes.*

Much too common to need further details.

28.—THE SPOTTED EAGLE.

Aquila clanga, Pall.

I have never found this bird breeding, but am indebted to Mr. J. Davidson, C. S., for the following interesting note:—

"Not uncommon in the Tapti Valley, breeding in the hot "weather in high trees along the water courses coming out of "the hills. The nest is placed in a fork, not near the top of the "tree, but very similar in position to that of *L. cirrhatus*; it is "however smaller. The bird so far as I have been able to observe "lay but a single egg."

Khandesh, 13th April, 2 single eggs. *J. Davidson, C.S.*

29.—THE INDIAN TAWNY EAGLE.

Aquila vindhiana, Frankl.

The Tawny Eagle is fairly common throughout Western India, except perhaps in the more densely-wooded or marshy tracts; they breed from about the end of October up to the middle of March, but most eggs will be found during the months of December and January.

The nest which is flat is composed of sticks, lined with green leaves, and is placed on the small branches near the top of a high tree, occasionally in a fork; the eggs, two in number, seldom three, are subject to much variation in size and shape, but are usually a broadish oval, slightly narrower at one end; the average of a large number measured was 2·62 inches in length by nearly 2·12 in

breadth ; the texture is fine, and the lining pure sea-green. In colour the eggs are greyish-white, more or less spotted with brown and reddish-brown ; sometimes the markings are bright and well defined, but as a rule they are not richly coloured.

Neemuch, 20th November to 2nd March. *H. E. Barnes.*

Too common for further details.

30.—THE LONG-LEGGED EAGLE.

Aquila hastata, Less.

Mr. J. Davidson, C. S., has kindly furnished me with the following note :—

"This was the common eagle of Central Mysore, and no doubt "extends northwards into the Belgaum district. I took a nest in "Mysore on the 13th March 1877, which contained one very bril- "liantly coloured egg. The birds which I shot would have laid "another the next day, the nest had apparently been a large one, "but was blown down, and the egg was laid on a heap of sticks, not "as big as an ordinary nest of the Shikra ; it was in a fork and not "in the branches of a tree."

33.—THE CRESTLESS HAWK EAGLE.

Nisáétus fasciatus, Gm.

The Crestless Hawk Eagle occurs throughout the district, but is nowhere common. They breed principally during December and January, but eggs are occasionally found early and later. They nest, as a rule, on ledges of rocky cliffs, which are often very difficult of access, owing to the site chosen being under a projecting crag, but sometimes they breed on trees. The nest when on a cliff is a small one, but when on a tree it is of an enormous size ; it is composed of sticks lined with green leaves. The eggs, two in number, are moderately broad ovals, measuring 2·75 inches in length by about 2 in breadth; they are pale greyish-white in colour, sometimes unspotted, but are generally thinly marked with yellowish or reddish-brown spots. They are seldom if ever richly-coloured. This bird does not use the same nest yearly ; it seems to have two or three eyries in the same neighbourhood, and breeds in one of them.

Sholapur, 15th January. *J. Davidson, C. S.*

Khandesh 24th Dec. to 5th January. (Cliffs.) „

35.—THE CRESTED HAWK EAGLE.

Limnáétus cirrhatus, Gm.

The Crested Hawk Eagle is confined to the hilly tracts of the district, and appears to be uncommon everywhere, except perhaps in Ratnagiri.* They breed during the first three months of the year, making a large stick nest high up in a fork of a lofty tree; it is usually lined with green leaves. They lay but a single egg. which is white, devoid of markings; the lining is pale green, and it measures 2·65 inches in length by 1·9 in breadth.

Although they allow no other bird to build on or near the tree in which they have placed their nest, yet they make no attempt to defend it from the attack of a bird-nester, and forsake it on the least provocation.

They are a long time making their nest, and it is often finished weeks before the egg is laid.

Khandeish, 16th February to 13th April. — *J. Davidson, C.S.*
S. Kanara, December to April. — *C. Vidal, C.S.*

38.—THE COMMON SERPENT EAGLE.

Circáétus gallicus, Gm.

The Common Serpent or Short-toed Eagle is sparingly distributed throughout the greater part of Western India, but has not as yet been recorded from Ratnagiri. They are permanent residents breeding during the first three months of the year, placing their nests as a rule on trees, more rarely on ledges in the faces of rocky or clayey cliffs.

The nests are rather large, and are composed of sticks, sometimes with grass intermixed, and they are often lined with green leaves.

The egg, they lay but one, is broad oval in shape, slightly tapering at one end; it varies a good deal in size, but the average is 2·9 inches in length by about 2·3 in breadth; it is unspotted bluish-white in colour. The egg lining is a beautiful sap-green. Although they frequent the neighbourhood of the nest for a long time after it has been robbed, they do not appear to lay a second time. This Eagle it the Jean-le-blanc of the French, so called from its beautiful white breast.

* Mr. Davidson, C. S., found this to be the common Eagle of W. Khandesh. *Vide* B. N. H. S. Journal, p. 194, No. 4, Vol. I.

Mr. Davidson, C. S., found it breeding east of Sholapur, on cliffs, in December and January.

Neemuch, 2nd March. *H. E. Barnes.*

39.—THE CRESTED SERPENT EAGLE.

Spilornis cheela, Lath.

The Crested Serpent or Indian Harrier Eagle is very rare, but specimens have been obtained from several widely separated localities within the limits of the Presidency.

* A specimen in the Bombay Natural History Society's collection bears a label, stating that it was shot off the nest, which contained but a single egg.

The nest is placed in a fork half way up a tree, always in the neighbourhood of water; it is made of sticks and twigs, lined with grass and green leaves. The egg, they do not appear to lay more than one, is generally of an oval shape, rather smaller at one end; the colour is *greenish-*, *bluish-*, seldom reddish-white, and is more or less spotted and blotched with reddish or purplish-brown. They are occasionally very richly coloured.

Mr. Hume found the eggs to average 2·78 inches in length by nearly 2·2 in breadth. They breed during the hot season.

39 *bis.*—THE LESSER HARRIER EAGLE.

Spilornis melanotis, Jerd.

The Lesser Harrier Eagle is not uncommon in the Rutnagiri district, and is sparingly distributed in the hilly tracts and jungles along the Western Ghats, where it is said to breed during the hot weather, both nest and eggs being of the same type as those of the larger and better known Serpent Eagle, *Spilornis cheela*, but the eggs, occasionally at least, are two in number, and are smaller.

Not much is known at present regarding the nidification of this interesting bird.

It is considered by many to be only a sub-species of *S. cheela*, but I believe an examination of the specimens in Mr. A. O. Hume's collection (now in the British Museum), would result in its re-establishment as a good species.

S. Konkan, 18th to 20th March. *G. Vidal, C.S.*

* This specimen was shot by Mr. H. Littledale, at Pattra, Panch Mahals, 12th April, 1886. *Vide* B. N. H. S. Journal, p. 195, No. 4, Vol. I.

32.—THE INDIAN RING-TAILED EAGLE.

Haliáétus leucoryphus, Pall.

The Indian Ring-tailed or Fishing Eagle is very common in Sind, and occurs, but more sparingly, in Guzerat and Rajpootana.

They breed during November, December and January, making a huge stick nest, high up in a tree, always in the immediate vicinity of water. As the birds use the same nest year after year, it is often of immense size, some of the sticks composing it being as thick as a man's arm. They make no attempt to defend their nest while it is being plundered, and if the eggs are taken, will lay another clutch within a fortnight.

The eggs, two or three in number, as often one as the other, are usually broad ovals in shape, averaging 2·8 inches in length by about 2·17 in breadth; they are unspotted white in colour, but get much soiled as incubation proceeds.

Hydrabad, Sind, 25th Nov. to 3rd Jan. — *H. E. Barnes.*
E. Narra, Sind, November and December. — *S. Doig, Esq.*
Baoroda, 26th November. — *H. Littledale, Esq.*

43.—THE GREY-BACKED SEA EAGLE.

Haliáétus leucogaster, Gm.

The Grey-backed Sea Eagle appears to be restricted to the Sea Coast and a few miles up the larger rivers; it does not occur in Sind.

They nest during November and December on trees, which they occupy continuously, whether breeding or not.

The ground beneath the nest is strewed with snake and fish bones and other *debris*. Dr. Jerdon, in the *Birds of India*, gives a good account of a colony he visited at Pigeon Island, and Mr. Vidal a still better one in his *Ratnagiri Birds*, written for the *Bombay Gazetteer*.

The eggs, two in number, are unspotted white, measuring about 3 inches in length by 2·06 in breadth.

These eagles do not restrict themselves to a snake or fish diet, but occcasionally help themselves to a fisherman's fowl.

S. Konkan, October to December. — *G. Vidal, C. S.*

48.—THE WHITE-EYED BUZZARD.

Butastur teesa, Frankl.

The White-eyed Buzzard is common in all parts of the district, except in Ratnagiri and the more densely-wooded tracts, where it is rare. It is a permanent resident, wherever it occurs, breeding

much later than most other members of the family, the month of April being the best to search for eggs.

The nest is placed in a fork high up in a densely-foliaged tree, usually an outer one of some small clump, and is rather a loose untidy affair, composed of sticks and twigs, and is unlined. It is often completed long before the birds are ready to lay.

The eggs, three in number, occasionally only two, much more rarely four, are broad oval in shape, and unspotted greyish or bluish-white in colour, averaging rather more than 1·8 inches in length by 1·53 in breadth. The egg lining is sea-green. The birds hang about the nests for days after it has been robbed, and sometimes lay again. They build a new nest every year.

Neemuch, 5th April. *H. E. Barnes.*

They are too common to need further details.

55.—THE BRAHMINY KITE.

Haliastur Indus Bodd.

The Maroon-backed or Brahminy Kite is distributed more or less commonly throughout the district, but is much more plentiful on the sea coast and in the vicinity of the larger rivers.

It breeds during the first three months of the year, making its nest on any large tree, as a rule in the immediate vicinity of water, cocoanut palms when available being preferred; it is composed of sticks, and is generally unlined.

The eggs, two in number, are moderately broad oval in shape, averaging about 2 inches in length, by nearly 1·65 in breadth; they are greyish-white in colour, feebly spotted with pale dingy and reddish-brown. They are rather smaller than those of the Common Kite. They do not defend their nests from the assaults of the bird-nester, and desert them on the least provocation.

E. Narra, Sind, 4th April.	*S. Doig, Esq.*
Hydrabad, Sind, 3rd March.	*H. E. Barnes.*
Bombay, 2nd February.	,,
Khandesh, 29th January.	*J. Davidson, C.S.*
Nassick, 4th December to 16th January.	,,
S. Konkan, January to March.	*G. Vidal, C.S.*

56.—THE PARIAH KITE.

Milvus govinda, Sykes.

The Common or Pariah Kite is abundant throughout Western India; it has a most extensive breeding season, commencing early

in September, and eggs have been taken as late as the middle of April, but November and February are the months in which most eggs will be found. It is very probable that they breed twice in the year. They are by no means fastidious in selecting a site for a nest, but commonly a fork, high up in a tree, or a flat branch at its junction with the trunk is chosen, no matter whether it is situated in the open jungle, in a compound, or in the very midst of a village or town. A tree in the vicinity of a meat market is often selected, and the cornice of a building is sometimes made use of, but this latter not often, except, perhaps, in a place lik Karachi, where suitable trees are rare. The nest is an untidy mass of sticks and twigs, lined with leaves, rags, or any other available rubbish. The eggs, two in number, often three, are oval in shape, and average 2·2 inches in length by about 1·77 in breadth. They are greyish-white in colour, spotted, speckled, streaked, blotched, clouded, or mottled, with various shades of brown and red. Some few of the eggs are almost unmarked, but occasionally they are handsomely and richly coloured, having blood-red blotches clearly defined on a white ground; between these two extremes every possible variety occurs. They are very fierce in the defence of their nests, especially when they contain young or much incubated eggs, swooping down and striking the climber with wings and claws. They are good and useful scavengers, but are nevertheless a great nuisance, especially near a poultry yard, having a predilection for young chickens, and they often succeed in carrying off a sickly half-grown fowl.

They infest camps, and seem to know the time for dinner or other meals, being much more numerous and active at these times than at others; a piece of meat left exposed for a moment is certain to be carried off, the successful marauder being closely followed by his fellow-kites, each eager to take it from him, and the coveted morsel changes owners many times before it is finally disposed of.

The nests are too common to need detailed dates.

57.—THE HONEY BUZZARD.

Pernis ptilorhynchus, Tem.

The Honey Buzzard is comparatively rare, only occurring as a straggler throughout the greater portion of the district, but in the Deccan and more eastern parts of the Presidency it is less uncommon.

Messrs. Doig and Littledale found a nest, one egg, at Singargarh, near Seonth, Panch Mahals, on the 25th April 1886. The egg was white, faintly marked with brown at the larger end. *Vide B. N. H. S. Journal*, p. 195, No. 4, Vol. I.

It is probably a permanent resident in those places in which it occurs, breeding during the hot season, making its nest on trees, at some height from the ground. The nest is neatly and compactly built, well lined with dead leaves. The eggs, two in number, are broad oval in shape, many of them being almost spherical; they measure about 2 inches in length by 1 72 in breadth. The ground colour varies from white to buffy-white, and the markings (consisting of blotches, clouds and mottlings) vary from reddish-brown to deep blood-red. They are as a rule very richly coloured. The shell is thin and brittle, smooth in texture, and usually quite devoid of gloss; the egg lining varies from greenish-white to dingy yellowish green.

Mr. Davidson says, *in epis:* "I think it breeds very sparsely "in this Presidency. I took a nest in Mysore, on the 14th February "1878, and I have had eggs sent me from Tanna, taken, I believe, "in March. The nest I took was quite invisible from below the "tree, and was high up in a thick mango. I saw the bird carrying "sticks into the tree, otherwise I should never have found the "nest."

58.—THE BLACK-WINGED KITE.

Elanus cæruleus, Desf.

The Black-winged Kite is distributed generally throughout the plain portion of the Presidency, sparingly in the north but becoming more common in the Deccan. It breeds at the close of the year, building a neat compact stick nest, lined with grass, in a fork in the upper portion of a tree The eggs, three or four in number, are broad oval in shape, measuring about 1·5 inches in length by a little less than 1·2 in breadth; they are greyish or creamy-white in colour, mottled and clouded with various shades of reddish-brown and dingy-red, occasionally approaching to blood-red; they are rather chalky in texture, and the egg lining is pale sea-green.

Mr. H. Littledale found a nest containing three incubated eggs at Tandalja, two miles from Baroda, on the 23rd October 1885, and a nest with young birds early in the same month.—*B. N. H. S. Journal, page* 30, *No.* 2, *Vol. I.*

Mr. Davidson, C. S., notes that the birds were very common during the season of 1878 to 1879, at Sholapur, Poona, and Khandesh; I also found it not uncommon at Deesa about the same time. Mr. Davidson has taken many nests at Sholapur and Khandesh, and he remarks that the nests were generally on small babool trees, from fifteen to twenty feet from the ground, but occasionally high up in a tree.

Sholapur, 20th September to 4th April. — *J. Davidson, C.S.*
Khandesh, 7th November. — ,,

60.—THE INDIAN SCREECH OWL.

Strix javanica, Gm.

The Indian Screech Owl is more or less common throughout the whole of Western India, less so in Sind and the North, more so in the Deccan and the South. They breed during December and January, occasionally later, in holes, in trees, wells and buildings, making no nest. The eggs are less spherical in shape than those of owls usually are, averaging 1·69 inches in length by about 1·28 in breadth; in number they vary from four to eight; probably when more than four are found, they are the joint produce of two birds.

In colour they are unspotted white, with just a faint tinge of cream. The texture is fine and compact, and they have but little gloss.

Deesa, 16th January. — *H. E. Barnes.*
Satara, 25th February. — *J. Davidson C.S.*
Khandeish, 1st December to 1st February. — ,,

65.—THE MOTTLED WOOD OWL.

Syrnium ocellatum, Less.

With the exception of Sind, the Mottled Wood Owl has been recorded from all parts of the Presidency. It is, however, somewhat locally distributed, not occurring as a rule in heavy forest, but much affecting small topes of trees in the vicinity of villages. It breeds during January and February, occasionally later, laying its eggs in holes in trees, or in a depression formed by one or more branches; it makes no nest. The eggs, two in number, are very broad ovals, measuring nearly two inches in length by about 1·67 in breadth. They are unspotted white in colour, many of them having a barely

perceptible creamy tinge. The eggs are very large for the size of the bird.

Khandeish, 10th Dec. to 12th February.	*J. Davidson, C.S.*
Nassick, 16th Dec. to 28th February.	,,
Saugor, 20th Nov. to 4th January.	*H. E. Barnes.*
S. Konkan, January.	*G. Vidal, C.S.*
Baroda, March.	*H. Littledale, Esq.*

69.—THE ROCK-HORNED OWL.

Bubo bengalensis, Frankl.

The Rock-horned Owl is common in suitable places throughout the district, with the exception of Sind, where it appears to be rare. It frequents river banks and nullahs, breeding from January to about the middle of March; but eggs are occasionally found both earlier and later. It makes no nest, but lays its eggs in a depression on the ground, under the shelter of a rock. They are three or four in number, rarely five, and are nearly perfect ovals in shape, measuring 2·1 inches in length by 1·73 in breadth. They are small for the size of the bird. In colour they are white, with a faint creamy tinge; they scarcely differ from those of the Mottled Wood Owl.

Sholapur, 6th to 12th December.	*J. Davidson, C.S.*
Khandesih, 25th November to 29th February.	,,
Nassick, 22nd January.	,,
Poona, 14th February.	*H. E. Barnes.*
Neemuch, 2nd March to 27th April.	,,
Baroda, March.	*H. Littledale, Esq.*

70.—THE DUSKY HORNED OWL.

Bubo coromandus, Lath.

The Dusk Horned Owl is common in the northern portion of the Presidency, but appears to be absent from the Sonth. It greatly affects mango topes in the vicinity of villages and along the banks of rivers and canals. It breeds as a rule during the months of December and Jannary, but eggs are often found much later. The nest is usually of large size, owing to its being used during many successive seasons. It is composed of sticks, and is generally placed in a stout fork in a lofty and densely-foliaged tree, but is occasionally built on a flat horizontal branch, or in a depression at the junctiou of a branch with the trunk. The eggs, two in number, are coarse in texture, and faint creamy-white in colour; typically they are broad ovals, but

vary much both in shape and size; they average 2·33 inches in length by about 1·89 in breadth.

Khandeish, 2nd January.	*J. Davidson, C.S.*
Neemuch, 7th December to 5th January.	*H. E. Barnes.*
Hydrabad, Sind, 14th December.	,,
E. Narra, Sind, December.	*S. Doig, Esq.*

72.—THE BROWN FISH OWL.

Ketupa chylonensis, Gm.

The Brown Fish Owl is rare in the north, but becomes more common towards the south. Its usual haunts are in the thick jungle along the banks of rivers and streams. It breeds from January to March. The nest is found in a variety of situations, in a hole in a tree, in a hollow in the fork of a tree, in a deserted Fishing Eagle's nest, or even on a ledge in the face of a cliff on the bank of a river. The eggs, two in number, occasionally three, are broad oval in shape, white in colour, with a barely perceptible creamy tinge. The average about the same size as those of the Dusky Horned Owl, from which they are not distinguishable. A fresh and an incubated egg will often be found in the same nest, owing to the female commencing to sit as soon as the first egg is laid. This habit seems to be general amongst the owls. The diet of these birds is not confined so exclusively to fish as is so generally supposed.

Satara, 14th February.	*J. Davidson, C.S.*
Khandeish, 19th January.	,,
Nassick, 16th January.	,,
S. Konkan, Jan. to March.	*G. Vidal, C.S.*

75 *ter.*—THE LARGE SCOPS OWL.

Scops bakkamuna, Forst.

The Large Scops Owl occurs, but is by no means common in Sind, Rajpootana, and some parts of Guzerat, but has not as yet been recorded from the more southern parts of the district.

It breeds from January to March, making a scanty nest of dead leaves and feathers in a hole in a tree.

The eggs, two in number, are very spherical in shape, measuring 1·25 inches in length by about 1·05 in breadth. They are pure glossy white in colour.

Khandeish, 11th Dec., inc. eggs and nestling.	*J. Davidson, C.S.*
Nassick, 19th March, fully fledged young.	,,

75 *quat.*—THE MALABAR SCOPS OWL.

Scops malabaricus, Jerd.

The Malabar Scops Owl occurs not uncommonly in Ratnagiri, but does not appear to have been recorded from any other district in Western India.

It frequents thick groves and cocoanut gardens. It is a permanent resident where it occurs, breeding very early in the year in holes in trees.

The eggs, three to six in number, are glossy white in colour, and are almost spherical in shape.

S. Konkan, Jan. and February. *G. Vidal, C.S.*

76.—THE SPOTTED OWLET.

Carine brama, Tem.

The Spotted Owlet is common throughout Western India, except on the ghâts and in the adjacent forest country; it appears to be absent from Ratnagiri, or at most to be exceedingly rare. It is a permanent resident, breeding during March and April. It is not particular in its choice of a site for a nest. An old decayed tree will afford a lodging for serveral pairs; in fact, holes in trees are their favourite nesting places, and they may often be seen peeping out even in the middle of the day. Holes in wells, in old buildings, in walls, under the eaves of houses, and holes in haystacks are each and all made use of by this very accommodating bird. They do not make an elaborate nest, a few dead leaves, pieces of grass and feathers thrown together anyhow, suffice for their requirements. The eggs, four in number, are often found in different stages of incubation; they are pure white in colour, and are rather broad ovals in shape, measuring 1·25 inches in length by about an inch in breadth.

This bird is too common to need detailed dates.

76 *quint.*—HETEROGLAUX BLEWITTI, *Hume.*

Mr. Davidson, C.S., found this bird to be a permanent resident in the plains jungle, north of the Tapti, but never found a nest.

77.—THE JUNGLE OWLET.

Glaucidium radiatum, Tick.

The Jungle Owl appears to be absent from Sind. It occurs in the jungle at the foot of Mount Abu, and through the Panch Mahals,

and is not uncommon on the Khandiesh hills. At Ratnagiri it is replaced by a bird intermediate between it and the Malabar Owlet.

It breeds during April and May, much in the same manner as the Spotted Owlet does, and the eggs do not differ in any respect from those of that bird.

Abu, 28*th April, nestlings.* *H. E. Barnes.*
Khandeish, 14*th April.* *J. Davidson, C.S.*
Nassick, 25*th April to* 21*st May.* ,,

78.—THE MALABAR OWLET.

Glaucidium malabaricum, Bly.

Typical specimens of the Malabar and Jungle Owlets differ considerably, but these differences are bridged over by so many intermediate forms, that it seems doubtful whether the one is anything more than a local race or variety of the other. The owlets of Ratnagiri and the southern portions of the district generally approach nearer to the type of G. *malabaricum* than they do to that of G. *radiatum ;* it is better, therefore, for the present to consider them as distinct.

It is a permanent resident, breeding during March and April, laying its eggs, which are indistinguishable from those of the Spotted and Jungle Owlets, in holes in trees.

They seem more diurnal in their habits than other members of the family usually are.

S. Konkan, 14*th April.* *J. Vidal, C.S.*

NOTES ON SAMBHUR AND SAMBHUR STALKING.

(Read at the Society's Meeting on 6th August 1888.)

By Mr. Reginald Gilbert.

My experience of the sambhur are confined to what I have seen of him in the Central Provinces, Central India, and the Bombay Presidency, and to one place in Australia where he has been successfully introduced. I have always shot them whilst stalking, and it is my boast that, although I have often had the opportunity, I never demeaned myself by shooting a sambhur in a drive. The time of the year I have devoted to the sport has been the Christmas vacation, and I have spent seven Christmas holidays stalking in the

Satpuras, at and near the Taptee River. The greatest bag I have ever made of sambhur was seven sambhur in six days during Christmas, 1879, and my lowest bag for the same period has been *nil*, working over the same ground and with equal opportunities. On the latter occasion my companion scarcely ever missed a day without getting a shot at a good stag, whilst I had but one shot the whole trip, which I missed. You will thus see there is a great element of chance in stalking. In December and January the sambhur are not in the hills, but inhabit the huge jungles which are found in the Satpuras generally within a mile or two of cultivation. In the night they wander sometimes into the cultivation near the jungle, or feed on favourite berries in the jungle itself. About 9 A. M., they retire into thick shade, more often in nullahs or at the tops of nullahs, and remain lying down till about 4 P. M. The jungle being thick and the grass high at this time of the year the sambhur is difficult to see, and if he remains in view for any period the branch of a tree or some high grass may spoil the sportsman's aim. Sometimes, however, he presents an easy shot. I have occasionally walked quite on to them sleeping in a nullah in the middle of the day. The sambhur then rises hurriedly and makes off as fast as he can go. On the other hand, if the sambhur hears one at a distance of 100 or 200 yards he rises and takes a good look to see who it is before making his rush.

AN ADVENTURE.

I do not propose to give you a scientific dissertation on the sambhur; but only a few notes of unusual adventures I have had out sambhur stalking taken from my shikar diary, written on the spot and at the time of their occurrence. My practise is to go with a small tent and as little kit as possible, taking with me all supplies for self and men. Sometimes I have had a companion with me, but more often I have gone alone. Even if one has a companion, he goes out in a different direction, so that one sees little of him except at night. I make one shikaree walk in front of me and one immediately behind, 50 yards or so behind. I have two other spare trackers or shikarees of sorts. Behind these a coolie carrying my photographic kit, and still further behind him my pony and a man carrying the tiffin basket. From dawn till 10 a. m. I work. I then find a cool place near water, where I stay till 3 p. m. My men always cook and eat their morning meal at this period. From 3 p.m.

till dark I stalk along towards camp, and generally time myself to arrive in camp just before dark. At Christmas the jungles are probably feverish, and camped as one is in the heart of the jungle, there is no doubt great danger of catching fever; but I have been singularly fortunate in avoiding it. I know no scenery more delightful than the jungles at the edge of the Satpuras in the neighbourhood of the Taptee River. At Christmas time the leaves of the trees show the gayest of tints, the grass is not yet dried up, and the whole jungle is closely watered with babbling brooks and nullahs of cool sparkling water. The climate, too, is delightfully cool except at mid-day. There are always a few tigers, bears, and panthers at this time, and although the jungle renders it almost impossible to shoot them, still I have had more than one adventure with these animals on my stalking trips. To a man fond of wild jungle life, I know of no more exhilarating amusement than a trip of this kind. Full accounts of this kind of sport and of this country will be found in Forsyth's "Highlands of Central India." Now for an adventure.

On the 30th December, 1884, in the early morning, whilst out with Mr. E. M. Slater, of this Society, we came across a fine stag sambhur on the edge of the Taptee, half eaten by tigers. The ground was soft around, and the marks of a tigress and cubs were only too evident. In fact, they had only left the kill on our coming up, it was certain, because we heard a sambhur belling at a short distance from us, the sure and certain sign of a tiger. Now I must leave the sambhur to speak about this tigress. The Taptee at this spot was very deep and at least 100 yards wide. We found that the tigress had dragged the sambhur up from the river, and the marks were very plain. On our next day asking a native close by who was tending cattle, he told us the tigress had killed on the other side of the river and swam across with the sambhur. We asked why the tigress had done this instead of eating on the other side of the river, to which he gave a very satisfactory reply, that the bank on the other side was bare and very steep, and in order to hide the kill from vultures, the tigress had to bring the sambhur across the river, the bank being too high and steep for the tiger to drag it up to the thick jungle at the top of the bank on the other side. We could not go across the river to absolutely verify this statement, but we could see with our glasses the marks where the sambhur appeared to have been dragged into the river down the steep bank on the other side, and there were the undoubted marks of its being dragged out

of the river by the tigress and killed on the side on which we stood. Our shikarees, most of them Bheels, assured us it was a fact, and appeared to consider the feat of a tiger swimming across the Taptee with a sambhur as nothing very wonderful. Whether the cubs had swum across, or whether the tigress had killed on the other side of the river and dragged the sambhur across to her cubs to eat we could not say, but it seemed to us a wonderful thing, that this tigress in the cold weather should take such a long swim, dragging a stag sambhur with her. The sambhur might, however, have become inflated with gas, which would render the task of dragging it across the river an easy one. To return to the sambhnr we left belling. We proceeded as quickly as we could to this in the hope of getting a shot at the tigress. We marched up to within thirty yards of a sambhur hind standing at the top of a broad dry nullah, covered with vegetation from top to bottom. The sambhur continued belling without taking the slightest notice of us, and was answered by other sambhur on the other side of the nullah. We took little notice of the sambhur, as we hoped by waiting still we should catch a glimpse of the tigress in the nullah below and get a shot. After anxiously waiting a few minutes, and hearing and seeing nothing of the tigress, we went even nearer to the hind, which made off. On the other side of the nullah, about eight yards off, was a fine stag sambhur with three or four hinds also belling. We watched this stag for some time determiniug to fire at him as soon as we wereassured the tigress was not in the nullah. We attempted no concealment ourselves, but the sambhur seemed perfectly panic-struck and appeared to look for no danger from our side. After a short time the stag walked slowly down the nullah, and then came up on our side and in our direction. I whispered to my companion the tigress had left the nullah or the sambhur would never have gone in the nullah, and suggested he should now kill the stag. He fired and hit too. Subsequent proceedings, however, will not interest you, although I have another little story about that tigress aud her cubs, which I dare not tell you because I should digress from the subject of this paper. We afterwards went down into the bottom of the nullah and found the tigress and her cubs had gone along the nullah quiet close to the sambhur.

THE LARGEST SAMBHUR ON RECORD.

Now for the largest stag sambhur on record. My experience

teaches me that the sambhur in the Satpuras are the largest in those parts of India of which I have any knowledge. I have enver seen the head of a sambhur from the Ghauts or the Concan of any size. They always have appeared dwarfed. It is true I have not seen many from those parts. In fact, there are but a few, and those are fast disappearing. I hope you will pardon my absence of modesty when I tell you that, so far as I can discover, I have seen and knocked the horn off the biggest sambhur in the world. The horn is here, and has been given by me to this Society. On the 27th December, 1886, when stalking with Mr. Barton near the Taptee River, a few miles from Asirghur, in the Central Provinces, I put up a monster stag sambhur out of a thick nullah. It ran down the nullah. I was standing on the top. I only saw him for a second or two, and had only time to take a snap-shot at him before he passed round a bend in the nullah. The shell hit his horn from behind and knocked it off, splitting it up as you see. I picked the horn up and here it is. I never saw that sambhur again; but to the last day of my life I shall never forget him or cease to regret I missed him. The horn you see is broken off just above or in the neighbourhood of the brow antler, and it measures from the broken end to the tip of the longest point along the outside 44½ inches. The horn being broken off above the brow antler, I can fairly assume the length of the horn was nearly, if not quite, 50 inches. The end of the horn where the split is appears slightly turned up, as though this were near the base of the horn. This, however, cannot be, as will be easily seen if the horn is held up in the right position. I shot at the stag running away. The mark where the 500-bore express shell hit the horn is plainly visible. This proves the horn to be the left horn, and also satisfies me that the end of the split portion is turned up at the spot where the brow antler joined. The top antler of this horn is 22 inches long. This gives the great length to the horn. I have been searching up authorities to find out the biggest horn on record. I find that in the *Asian* of 1884, especially the number of 20th August, 1884, the subject of the length of sambhur horns is fully dicussed. The *Asian* states the largest pair of horns on record are those known as the Coromanded Coast horns in the Calcutta Museum, and gives an illustration of them. The *Asian* appears to consider the largest to mean the heaviest in weight. The length of the longest bram of these horns is 41½ inches, and the right brow antlers 20 inches, the weight of both horns being together 22½ lbs.

These horns have nine tines, being three more than the regulation number, and are spoken of in the *Asian* by one correspondent as the "Coromandel monstrosity." They were picked up on the Coromandel Coast, and though there is every reason to suppose they are sambhur horns, still they are described as a trophy representing the utmost limit of eccentricity which nature is capable of producing. The weight of these horns is enormous, but this can be partly accounted for by the horns being malformed and containing three extra tines. The editor of the *Asian* stated that a correspondent wrote he had seen horns of 44 inches, and quoted another from *Wilson's Himalayan Journal* of 46 inches. One or two correspondents, I see, record horns of 39 inches as being large. Mr. Sterndale, in his book states he has in his collection a horn of 45 inches, whilst Mr. Inverarity tells me he has killed one of 44 inches. I have killed one or two heads over 39 inches and one of 41 inches. From a perusal of a book called "Nilghiri Sporting Reminiscences," it would appear the Nilghiri sambhur have but small heads, as the author of that work speaks of the best heads as being only 35 or 37 inches. Captain Forsyth, in the "Highlands of Central India," a great authority, speaks of 41 inches as the largest he had ever seen.

This is all the information I can give you about the size of sambhur horns, and it shows conclusively that this broken horn beats the record into fits by several inches. I should mention that this broken horn weighs 6 lbs. 3 oz., and assuming everything in its favour, it could hardly weigh so much as the Coromandel Coast horns, unless, perhaps, the extra tines were cut off the latter, and then, perhaps, the horn might equal the largest of them. I wrote a letter to the *Asian* some time ago describing this horn, in the hope that sportsmen and naturalists might supply some further information or discuss the subject, but with the exception of its publication by the editor, nobody took the slightest notice of it; I fear that I was taken for one of the 12 foot tiger school and thought unworthy of notice.

A FIGHT BETWEEN STAGS.

I have often come across places in the jungle where the bushes and grass have been trampled down and the ground torn up, showing the scene of a combat between two sambhur stags.

A few years since, whilst walking along the jungle overhanging the Tapti River, my attention was attracted by the noise of the clashing together of horns on the other side of the river, some 300

yards off, and getting out my binocular glasses, I watched a fight between two fine stags. I did not get a clear view of the fight because the bushes and high grass so often impeded the view; but I watched them for some time, and the fight continued for several minutes. I went round by a ford and got over to the other side of the river in the hope of getting a shot, but was unsuccessful. Sambhur are supposed to shed their horns annually in or about March as the hot weather comes on, but this is denied, I see, by the author of "Nilghiri Sporting Reminiscences," who states that the annual shedding of horns by sambhur is a myth in the Nilghiris, and he states that he has known, by undoubted evidence, stags carry their horns more than two successive seasons. Captain Forsyth, in the "Highlands of Central India," states he was perfectly convinced that neither in the case of the sambhur nor the cheetul are the antlers shed regularly every year in the forests of Central India. I have myself on a few occasions seen sambhur with good heads in May, and I have often seen cheetul with good heads in that month. I once shot a good stag sambhur in May. I think, therefore, we may be satisfied that sambhur do, as a rule, shed their horns annually, but there are often exceptions to the rule. In the hot weather in the Satpuras, when the jungles are burnt, I have noticed the sambhur often get together, five or six in a herd. I have seen as many as seven or eight. The jungle being very open there they are very wild and difficult of approach. Captain Forsyth speaks of seeing herds of thirty and forty in this neighbourhood. No such herds are to be seen now. They appear to like to keep up in the hills in the hot weather, and do not often come down in the plains below in the day time.

SAMBHUR NEAR BOMBAY.

There used to be sambhur in the island of Salsette. In 1877 I was in at the death of one on the top of the high hill over Vehar Lake, within 18 miles say of where we now are. I regret to say she was a hind, but for my own reputation I must say I had no hand in killing her. I believe she was the last survivor of the race in Salsette, as I have never heard of any there since. At Lanowlee, close to the reservoir, I once put up a doe sambhur with its fawn whilst beating the jungle. Alas! two valiant railway men from Lanowlee killed them both next day, and I believe there are none in that neighbourhood now. Sambhur occasionally bell when they

are disturbed by man, but they always bell when they see a tiger. On two occasions when beating for tiger, I have known a sambhur driven out past the guns without sounding any note of alarm, but when some distance behind commence to bell. On both these occasions the tiger was behind the guns and near where the sambhur commenced to bell, so that I infer he must have seen the tiger and then commenced to bell. It would, therefore, appear that the sambhur bells when he sees the tiger either to warn any of his mates who may be in the neighbourhood, or to express his hatred like the monkeys, who often follow the tiger from tree to tree and rock to rock swearing all the while, and that the belling is not necessarily caused by fear. A native shikaree first drew my attention to this theory, and I have talked with one or two sportsmen, whose experience was much the same as mine.

ANTIPATHY TO TIGER.

The well-behaved monkey never swears, except at a tiger or panther, but the sambhur, who is of a lower order, occasionally swears his swear at something else besides the tiger. There is no doubt the tiger is the sambhur's deadliest foe, and that he frequently affords food for the tiger. I have several times come across the remains of sambhur killed by tigers. After I had written the above, I happened to come across a passage in the "Nilghiri Sporting Reminiscence," in which the author, who appears to have had considerable experience of sambhur stalking, states that the sambhur never bells upon seeing a man but only at the sight of a tiger; but I know him to be wrong there, because I have on a few occasions had a sambhur bell at me when I have disturbed him. I have used the expression "bell" throughout because that is the word generally used, but I think "bark" would be a more expressive word.

SAMBHUR IN AUSTRALIA.

Sambhur and Cheetul have been brought to Australia from India and turned down. I am told that cheetul thrive wild, and have increased at a great pace in Gippsland, Victoria, but I saw none of them and can give no personal information about them. Last year, however, I made the acquaintance of the sambhur in Victoria, at a station called Ercil-down, belonging to Sir Samuel Wilson. I saw about seventy in a large deer park. In the middle of this park there was a hill and the ground was well suited for sambhur. They,

however, all seemed dwarfed, and none of the stags had heads of any size worth mentioning. The climate is rather cold in winter for them there, and this may account for it. It was in the month of August, the cold weather there, when I saw them, and at that time the stags had their horns. I saw none in velvet. In the month of August in India, sambhur would be in velvet, of course. As these sambhur increased, they were from time to time turned down wild in the neighbouring hills, and I was told they thrive in a wild state.

THE MEANS OF SELF-PROTECTION POSSESSED BY PLANTS.

(*Read at the Society's Meeting on 6th September* 1888.)

By Dr. W. Dymock.

The number of destructive insects which abound in India render it very necessary that plants should have some means of protecting the stores of starch which they elaborate for future use. Amongst the starch-storers there is no class in this country more abundant than the Aroideæ, especially at this season of the year. Some plants of the genus, such as the *Amorphophallus campanulatus*, or, सुरण, produce enormous tubers under cultivation, weighing as much as eight or ten pounds or more, and composed almost entirely of starch. Different kinds of Colocasia, known in the vernacular as अळूं, are always to be seen in the gardens, of even the poorest people, during the rainy season; and their leaves, stems, and tubers are favourite articles of food amongst all classes of the population. The leaves especially made into a roll with gram flour, and spices, boiled, and then cut in slices and fried, form a very tasty vegetable dish called पातवडी or पातवड. *i.e.*, "leaf-cake." The *Colocasia antiquorum* is one of the oldest vegetables known, and derives its Latin name from the Coptic Kalkasi. Pliny notices it as a favourite vegetable in Egypt. Most of the varieties of Colocasia and other edible Aroids are so acrid that it is only by prolonged boiling and the addition of some vegetable condiments containing citrates that they can be made palatable; they all die away in the dry weather after producing one or more tubers. It must be

evident to every one that a large starchy tuber would stand a very poor chance of escaping destruction during the many months it has to remain just beneath the surface of the ground awaiting the next rainy season, were it not that nature affords a sufficient protection by storing in the root-cells a number of needle-shaped crystals which cause the most intense irritation when ingested by any animal, and have often proved fatal to man. The effects produced by the raw or imperfectly cooked plant are swelling of the tongue and throat, convulsions, asphyxia, and other signs of poisoning by an irritant.

Pedler and Warden in 1886 were the first to point out that the toxic effects of Kachoo (the Bengal name for Colocasia) were due to entirely mechanical causes, and that the tubers contained no specific organic poisonous principle as had hitherto been supposed. The same theory has since, apparently, been independently adopted by Herr Stahl, who, at a recent meeting of the Jena Naturalists Society, read a paper upon the significance of those excreta of plants which are known as raphides. From experiments this investigator inferred that they were a protection to plants against being eaten by animals. Many animals avoid plants with raphides, or eat them reluctantly, and snails in eating these plants select those parts which are without the crystals. (*Nature*, Dec. 29th, 1887.) Messrs. Pedler and Warden's experiments showed that these needle-shaped crystals are composed of calcic oxalate, a salt very insoluble in water even after moderate boiling, which accounts for the acridity of the tubers when cooked in the ordinary manner; they also demonstrated that the addition of nitric and hydrochloric acids, which dissolve the salt, immediately removes the acridity of the tubers. Two difficulties still remained—1st. it is well known that the dried tuber is practically harmless, but microscopic examination explained this by showing that the crystals, which in the fresh root are arranged in loose fan-like bundles, are in the dried root brought parallel to one another and become adherent, forming practically a single blunt crystal; 2nd, how is it that the hydrochloric acid of the gastric juice does not dissolve the crystals and thus prevent irritation of the intestines? The answer is that excessive irritation of the stomach produces a stoppage of the flow of gastric juice, and the pouring out of a ropy mucus instead. (See Pedler and Warden's paper, Journ. Asiat. Soc. of Bengal, Vol. LVII., Part II., No. 1, 1888.) When cooking these plants the natives of India

use mango or limes to remove the acidity. They have found by experience that kokum and tamarinds will not answer for this purpose. I find by experiment that calcic oxalate is soluble in a solution of citrates but not in a solution of tartrates and malates, to which the acidity of tamarinds and kokum is due. Schima Wallichii, a tree of Nepal belonging to the Ternstræmiaceæ, affords us an excellent example of a very starchy bark protected from the attacks of animals by a peculiar development of the liber, which resembles sharp glistening white needles, and causes much irritation when handled. The Nepalese call the tree *chilauni*, or itch tree, and *makkarchal*, or spider's itch tree. The liber cells are about $\frac{1}{12}$ of an inch long, translucent, and sharp-pointed at both ends ; the bulk of the parenchyma consists of cells containing starch and a red colouring matter ; by macerating the bark with water, the liber cells are easily separated and may then be examined under the miscroscope.

The bulbous roots of squills and many of the Liliaceæ are protected by the presence of irritating raphides, the effects of which are well-known to those who have to slice these bulbs preparatory to drying them for medicinal use. The raphides, like those of the aroids, consist of calcic oxalate deposited in cells containing mucilage and forming bundles of needle-shaped crystals or large solitary square prisms. Oxalate of calcium is generally associated with mucilage in most plants, and this fact is remarkably evident in the squill and other lily bulbs. If these bulbs are finely sliced and shaken in a bottle with water, a quantity of the crystals will be deposited, and are clearly visible to the naked eye, but it must not be supposed that every plant which contains calcic oxalate has acrid properties. This depends entirely upon the shape of the crystals, of which thirty-four forms at least have been observed in European plants.

In a recent number of the Dutch journal, *Maandblad voor Natuurwetenschapen*, J. H. Wekker, in an article upon "De vorming der kristallen von oxalzure kalk in de plantencel," shows, that even in the youngest cells the crystals are always found in the vacuole, and if the microscope be inclined, they will show by gravitation that they are free and not embedded in the protoplasm.

Wekker found this to be the case in twenty-nine different plants examined by him, only occasionally a crystal adheres to the protoplasm bordering the vacuole and is set in motion by it. These observations explain the rapidity with which the irritating effects of

the crystals are produced when the plant is wounded by the teeth of any animal.

Crinum ornatum, Wight, the pretty white lily so common in the Concan, and known to the native as गदांभकिंदा, has such acrid bulbs that they are used to blister cattle.

Several species of Vitis protect their tubers by the same mechanical means, *V. indica* for example, *Vitis carnosa* protects its fleshy stems, and *V. lanceolaria* its fruit, whence it has received the Marathi name of खाजगोलाचीवळ, or itch-berry-vine.

Gnetum scandens, उचाळे, produces a plum-like fruit in the pulp of which are many stinging hairs of a reddish yellow colour.

Hibiscus cannabinus and *Sterculia urens* have formidable seed pods beset with stinging hairs. The different species of Mucuna protect their pods in the same manner. I need hardly mention the many thorny plants found in this country, as their means of protection is so obvious The nettles form a separate class, their irritating action being partly mecbanical and partly chemical. The stinging hairs with which these plants are armed are hollow ; at the base of each hair is situated a gland containing an acid (formic). When the hair enters the skin and is broken off, the pressure causes the discharge of the acid, by which a swelling is produced like that caused by the sting of many insects. The nettle tribe is well represented in India by the Pouzolzias, Gerardinas, Bœhmerias, and Urticas. A species of Pouzolzias is known to Europeans as the Nilgiri nettle, and *Urtica interrupta*, खाजोरी, is a common weed in neglected corners of the Bombay gardens at this time of year, and is not unlike the common English nettle. It may be thought that nettles have little worth protecting, but the genera Bœhmeria and Pouzolzia yield some of the strongest and finest fibres in Asia.

Many plants are protected by their poisonous secretions, notably those of the Euphorbiaceæ. Well-known examples are afforded by the genera Excæcaria, Euphorbia, Ricinus and Croton, all containing poisonous principles which protect their foliage and fruit from injury.

The *Excæcaria Agallocha* so common about Bombay derives it Latin name from excæcare, to blind, and is called by the Marathas फुंगाल, on account of the great swelling and pain caused by contact with its acrid milky juice. It is difficult to induce labourers to cut or interfere with the tree, so much do they dread it, and animals equally avoid it. This plant, although it bears the name of Agal-

locha, does not produce Aloewood, but the herbalists obtain the dry inert suber from old trees, and sell it as a strengthening medicine under the name of Tejbal. The poisonous principle contained in the juice has not been properly examined, but it is probably an acrid resin like that from gum euphorbium, which is well known as a blistering agent.

The genus Euphorbia is a very large one, and most of the plants are remarkable for a milky poisonous juice which makes them obnoxious to animals. Thus in Guzerat we see the hedges made of the *Euphorbia Tirucalli* or milk bush, which though a fragile, smooth plant, so abounds in milky poisonous juice, that cattle will not break through it. *Euphorbia neriifolia*, another hedge plant. yields a similar juice, and it is also protected by thorns; others of the genus have the same properties. The poisonous principle of such of the Euphorbias as have been examined chemically appears to be identical, and the same as that of the drug Euphorbium. They also agree in yielding to analysis, a crystalline substance, called Euphorbon. The Ricinus, or castor-oil plant, which is such a common weed here, protects its oily seeds from destruction by a powerful toxic principle quite distinct from the purgative oil with which we are all so well acquainted. These seeds have in Europe often proved fatal to children, even when very few have been eaten. Dr. Stillmark has recently discovered in them an albumenoid body which he has named *ricin*, and which produces the most violent inflammation of the gastro-intestinal tract in men and animals. A dose of six milligrams of *ricin*, which would be contained in about ten seeds would be sufficient to kill an adult man. The results obtained by the experiments of Dr. Stillmark are confirmed by experience, for we find that when children eat the seeds, which are scattered on the wharf during the discharge of Cargo in Europe, they suffer from severe vomiting and prostration, but not from catharsis. Croton seeds owe their immunity from the attacks of insects to the presence of crotonoleic acid, the most violent cathartic known.

Nerium odorum, the sweet-scented oleander belonging to the Apocyneæ, is a most poisonous plant, and is never eaten by animals. Its Sanskrit name Asvamaraka, or horse-killer, shows that its properties have long been known in India; and De Gubernatis informs us in his Mythologie des Plantes II., 257, that the closely allied plant Nerium Oleander of Europe is called in Italy ammazza

cavallo, or ammazza l'asino, and remarks that this accounts for the dread of its presence shown by the ass of Lucian and Apuleius. Both plants are poisonous. Our Indian oleander contains two active principles, *neriodorein* and *neriodorin*, both powerful heart poisons; these exist in all parts of the plants, as has been frequently demonstrated by the poisoning of children who have eaten the leaves or flowers.

The oily kernels of the marking nut and cashew nut are protected by their pericarps, full of an acrid blistering fluid containing anacardic acid.

We all know how nauseously bitter most of the wild Cucurbitaceæ are in this country. Were it not so, their soft pulpy fruit would be exterminated by the snails and slugs, which abound at the time of year when most of them ripen. When, under cultivation, cucumbers and melons have lost their bitter, purgative, and emetic principles, they require the constant watchfulness of the gardener for their protection.

Bitterness or astringency in the bark of many trees doubtless saves them, to a great extent, from being injured by cattle.

Some bulbs, such as onion and garlic, as well as some cruciferous plants, are obnoxious to animals, on account of the pungent oils which they develop. No animal appears to relish mustard, but almost all the Cruciferæ, as well as onions, garlic, &c., are eagerly sought after by man. The leaves of *Anona squamosa*, the custard apple, are not browsed upon by cattle, and when crushed they have an acrid and disagreeable odour, so much so that the country people use them instead of smelling salts as a remedy for the vapours. The leaves, young fruit, and seeds are powerfully insecticide, and are in common use for washing the head when the population become too lively.

Rue is protected by its nauseous volatile oil; terebinthinate exudations and gum-resins make many trees and umbelliferous plants obnoxious to cattle. The mints, the balms, and basils, though their odour is pleasant to man, are not generally depastured by animals; even in Arabia, where pasture is scarce, the common wild basil or Calamintha (faranjmishk) is left untouched.

Camphor appears to be particularly disagreeable to animals, and a numerous class of plants in India owe the safety of their starchy depôt to this subtance, or in some instances, to an acrid resin. I allude to the Scitamineæ. In this class most of the Curcumas have

camphoraceous tubers; those which do not smell of camphor are more or less acrid, such as *Curcuma caulina* the Mahableshwar arrowroot; ginger contains an acrid resin and a volatile oil. When dried, these tubers are freely eaten by weevils and mites, which appear then to be able to separate the starch cells from those containing resin and odorous principles.

Bony coverings or shells protect many seeds. The sea cocoanut and bonduc nut are carried about by the ocean for months without losing their germinating power. Bonduc nuts have even been found on the coasts of Scotland.

Lastly, the seeds of the smaller weeds, which germinate so abundantly on the first fall of rain, owe, to a great extent, their preservation from destructive insects, during the hot season, to their forms, which often so nearly resemble grains of sand or earth that, when mixed with the soil, they are most difficult to distinguish.

Of this fact we may satisfy ourselves if we carefully powder and lift a little dry mould or sandy soil from a road, and then, having with the aid of a lens removed everything which has the appearance of a seed, place it under a glass bell and keep it moist with distilled water. However carefully the experiment may be conducted, we shall find that in a short time some of the familiar road-side weeds will make their appearance.

THE NATURAL HISTORY OF A VOYAGE FROM LIVERPOOL TO BOMBAY.

By E. H. Aitken.

(Read at the Society's Meeting on 1st October 1888.)

The Naturalist on board a steamer suffers the pains of Tantalus, who was doomed to pass eternity, hungry and thirsty, with food and water always in sight, but just beyond his reach. On a steamer one rarely passes a day without seeing something of interest, but rarely secures a specimen. He could easily shoot valuable birds, which he will never see again, but I have never met with a captain enlightened enough to stop his steamer in the interests of science and pick up the treasure. However, the organ of a true naturalist's faculty is his eye, and perhaps, after all, the discipline is

wholesome which forces him for a time to stay his hand from slaying and content himself with watching. I spent much of my boyhood prowling about stealthily, with a catapult in my hand, plotting against the lives of little birds. The little birds were rarely any the worse, and I learned more of their habits, voices, and distinguishing characteristics than I have ever done since. Now I go out with a gun, and if I meet with an unfamiliar bird, I have scarcely a chance of becoming acquainted with it before it ceases to be a bird and becomes a specimen. I have the specimen, but that is poor compensation. Every day I live I become more confirmed in the conviction that no naturalist can adopt a wholesomer motto than the saying of a very wise man, of whom it is recorded that "he spake also of beasts and of fowls, and of creeping things, and of fishes." The saying I refer to is this, "A living dog is better than a dead lion." I suppose every ship that leaves Liverpool is followed by a party of gulls, which accompany it all the way down the Channel, but leave it as soon as they see plainly that it is bound for other shores. These birds have become as dependent on man as the common Indian crow. Without our shipping and and our great seaports, I imagine half the gulls on the English coast would die of starvation. As it is, th ehard times of which we hear so much, seem to press severely on them. On a summer day last year, not far from Glasgow, I was surprised to see a large number of gulls at a great height in the air, crossing and re-crossing, and performing the most energetic evolutions in which I had ever seen gulls engaged. After watching them for a while, I discovered that they were engaged in hawking insects in the air, just as we see kites and crows in India preying upon a swarm of winged white ants. At Edinburgh I saw a number of terns engaged in the same way above Arthur's Seat. The party of gulls which followed our ship was composed exclusively of one species, the common grey and white herring gull, and the easy grace of their flight supplied matter for never-ending wonder and admiration. With the wind, or in a calm, they flap their wings and fly like other birds; but against a strong head wind they will keep up with the ship, overtake it, fall back, rise and sink, simply by holding their wings at a certain angle to the wind, on the same principle on which a good sailing boat can go almost in the teeth of the wind. In striking contrast to the gulls are the puffins with their short wings and clumsy beaks, more like parrots at sea than orthodox water birds. These

do not live in the air like the gulls, but on the water, floating very happily on the waves and constantly diving in pursuit of fish. These birds also leave us as soon as we are fairly out of the Irish Channel. Then the stormy petrels appear and scarcely leave us till we reach Port Said. All day they are on the wing in the wake of the steamer, skimming the water with all the power and grace of swallows. In fact, at a very short distance they are so absurdly like the common black and white swift, which makes its feather nests under the porches of our public buildings here in India, that the first time I saw them I exchanged views with a fellow-passenger, who was also a naturalist, upon the remarkable phenomenon of a swift taking to a marine life. Where these petrels go at night I cannot say. During the day they are very rarely seen to rest on the water. Mr. Wilson records an instance of one which was shot at from a ship, with the result that two of its quill feathers were broken, and their ends hanging down, made it easily recognisable afterwards. For a whole week that bird continued to follow the ship. If it had stopped to sleep for even an hour it could scarcely by any chance have found the ship again, and as they never rest on the rigging or any part of the ship, it seems that this bird must have been on the wing night and day for a week with no intermission, except, perhaps, an occasional rest on the water for a few moments. I have watched them with a powerful glass to see if I could ascertain what they fed on, but could not satisfy myself. Undoubtedly they do sometimes, like gulls, pick up scraps of food thrown overboad, but from the persistent way in which they beat up and down the line of seething water which flows from the stern of the steamer, I have got the impression that they are on the watch for small marine creatures killed or tossed to the surface by the action of the screw. I should like to know whether they follow sailing vessels in the same way. I must not forget to mention that I saw one petrel on this side of Aden, which, I suppose, was Wilson's petrel (*Oceanites oceanica*). After passing Cape Finisterre, whales are often seen spouting, but they rarely come near enough to a steamer to be distinctly seen. A few years ago, however, one of the B. I. S. N. Company's steamers, coming from Kurrachee to Bombay, was accompanied for a whole day by a whale, which came so near, I believe, as almost to rub against it. Some of the passengers or officers, following the true Englishman's instinct of killing, fired rifle balls into it. I do not remember whether the whale showed

any signs of being aware of this. Curious to say, the best view I ever had of a whale was between Kurrachee and this. Four or five were playing within a mile or so of the steamer, and one monster several times rose above the surface like a volcanic island, quite near enough to give me a distinct view of it. This was, I suppose, *Balaenoptera india*, which is sometimes stranded on our coast. The skeleton of one which was so stranded near Bassein forms the 'piece of resistance' in the Victoria and Albert Museum. If whales avoid steamers, there is one marine mammal which has no such fear. This is the dolphin (*Delphinus delphis*), a near relation of the porpoise, which is common enough in our harbour, but easily distinguishable by its sharp snout, slender form and colour, which, in the water, appears to be silvery grey above and white beneath, though I believe that when the animal is out of the water its back is almost black. There is something very fascinating in the high spirits and jubilant happiness of this creature. It is just the animal to offer its back to Orpheus, though I would be scientifically sceptical about its being charmed by his music, on the ground that its ears being usually under water, his strains could hardly have reached them. The dolphin is very common in the Mediterranean, going in pairs or small companies. When they catch sight of a steamer, they race for it, leaping out of the water in concert when they want to breathe, as if they were steeple-chasing and clearing hurdles. When they reach the steamer they get in front of it, just under the bows, and sport in the foam which it drives before it, rolling over on their backs, leaping out of the water, diving, and performing marvels of agility, without betraying, by any motion which you can detect in fin or tail, that they are exerting themselves. All the time there is an expression of fun and happiness on their faces, if I may use the term, which is infectious and makes this one of the most delightful of the small excitements which enliven a sea voyage. Every dolphin in the Mediterranean seems to know the trick, and when we neared Port Said on my way out last month, three of the porpoises, which are so common in that harbour, came out to meet us and tried to disport themselves in the same way, but the clumsiness of their efforts was positively ludicrous to one who had seen dolphins doing the thing. All the way from Gibraltar to Port Said the ship is visited occasionally by land birds, butterflies, moths, and other insects. At two seasons in particular, about April and again about September, hundreds of migratory birds, crossing the

sea, are glad to get a rest. The sight of a quail in these circumstances is fitted to give one a vivid conception of this strange instinct of migration. Here is a bird which lives on the ground and for six months in the year never uses its wings except when "put up" by some enemy, and then only to fly a hundred yards and drop again; but when the sun enters the sign of Aries it starts off without fear from Alexandria, say, to Italy or Greece. Hundreds are often killed in Malta, I believe, when they arrive too tired to make much effort to escape, and, without doubt, hundreds perish in the sea; but I suppose the majority reach their destination. They fly very low, almost touching the water, and rising to every wave. I suppose this is to escape the force of the wind. All through the Red Sea and also between Aden and India migratory birds are met with. On this voyage I noted the following:—Quails, a hoopoe, one or two yellow wagtails, a wheatear or bushchat, a light brown robin with a rufous tail, a species of bunting, and several tree warblers. One of the last spent several days on the ship and was very hungry, hunting for insects in the joints and crevices of iron plates, poor birds! When within one day's sail or so of Aden, ships are often visited by peregrine falcons. I imagine they go far out to sea in pursuit of sea birds. When they settle on the ship they are often so exhausted that the sailors climb up the rigging and catch them. At the southern end of the Red Sea, gulls and other sea birds are on all sides, but disappear as soon as we pass Aden. After that we fall in with two very interesting birds, which have been given a place among our Indian avifauna, the Tropic bird (*Phaeton indicus*) and the Noddy (*Anous stolidus*). The former, a smoky coloured bird, as restless as the petrel, skims the surface of the water in all directions, but never follows the ship; the latter flies at a great height with a seemingly laborious flapping of its short wings, and drops into the water like a kingfisher. If its snowy plumage and long tail do not attract attention, its incessant screams will. Of fish in any form, except salt or tinned, one sees very little indeed during a voyage on a steamer, but on this occasion when we drew near Perim the *khalasees* threw out a large hook with a bit of white rag wrapped round it. This trailing from the stern of the vessel, looked very like a small fish rushing through the water, and succeeded in "taking-in" a large dolphin, not the mammal which I have mentioned already, but a species of fish which all sailors persist in calling the dolphin. Its proper name is the coryphene

(*Coryphæna hippurus*). I had so often found myself at variance with ancient mariners as to what was a dolphin, that I was very glad to have an opportunity of seeing this fish, which is certainly one of the most splendid of living creatures. When in the water it shines with dazzling brilliance, like burnished brass in a green light; but as soon it is taken out, it changes to various shades of dark green, blue, and purple, sprinkled all over with round spots of the most intense blue, and bordered or touched at various points with green and gold. As life ebbs, the colours become rapidly duller, but even in death it is a most beautiful fish. This is the fish to which Byron refers in describing a sunset in the Mediterranean—

> "parting day
> Dies like the dolphin, which each pang imbues
> With a fresh colour as it gasps away,
> The last still loveliest, till—'tis gone, and all is grey."

The *khalasees* consider the coryphene a great prize; but the captain and officers did not grudge in to them. I suppose it is coarse. The chief business of the coryphene is to pursue and eat the flying fish, and the chief use of the wings of the flying fish is to help it to postpone death by the coryphene. Flying fish are found in many seas; but between this and Aden they are so thick as to leave little room for water. All day they rise on both sides of the steamer, like locusts, their silver sides glittering in the sun. At this season (in September) they are mostly about four inches long. In April or May they seemed to me much larger and not nearly so abundant. At night they fall upon the deck in numbers and are eagerly picked up by the *hkalasees* to be converted into curry. As they fall, a splash of phosphorescence marks the spot. Many species of fish are phosphorescent; but without a microscope it was impossible to settle whether the luminosity in this case was not due simply to minute organisms in the water which fell from the fish. The waters of the Arabian Sea at this season become brightly luminous when agitated, owing to the presence of minute species of phosporescent protozoa; but, on the other hand, I twice noticed the whole sea become luminous for half an hour, so faintly that it just looked like Bombay milk, and this the captain attributed to a passing shoal of small fishes, probably flying fishes. Even if he was right, the effect might not be due to luminosity in the fishes themselves, but to the gentle agitation of the water as they passed through it. Before I leave this subject, I will remark that it does not appear to be generally known that the great Sea Serpent

is phosphorescent. Nor did I know it till one dark evening just a month ago. I was sitting on the deck engaged in my usual evening occupation of wishing it was bed time, when I saw, rushing through the water at a fearful rate with a wavy motion, something all ablaze, at least 60 feet in length. I sprang to my feet with a shout and ran to the side of the ship. The monster doubled upon itself and rushed close by the ship almost under me, and I saw plainly, just beneath the surface of the water, a huge porpoise leaving a trail of light behiud it! But it is time to stop. The last specimen I saw at sea was a native of Bombay, a large butterfly of the genus *Catopsilia* going out to sea. This is the way in which this and some other butterflies meet the difficulty of over-population. Soon after that specimen passed, we were at anchor and the cheering voice of the Bombay crow assured me that I was in this beautiful city once more.

Dr. D. MacDonald proposed a vote of thanks to Mr. Aitken for his paper, which was much appreciated by all present.

The Honorary Secretary stated that Mr. E. W. Oates, the well-known author of the *Birds of Burmah,* had given the Society, for publication in its journal, a valuable paper on *The Indian and Burmese Scorpions of the genus Isometrus*, in which he had described three new species. Mr. Phipson added that Mr. Oates, who was now in England publishing the *Birds of India*, had given the Society great assistauce in various ways, in recognition of which he (Mr. Phipson) proposed that Mr. Oates should be elected an honorary member of the Society. This proposal, on being put to the meeting by the Chairman, was carried unanimously.

ON THE INDIAN AND BURMESE SCORPIONS OF THE GENUS *ISOMETRUS*, WITH DESCRIPTIONS OF THREE NEW SPECIES.

By Eugene W. Oates, F. Z. S.

(*Read at the Bombay Natural History Society's Meeting on 1st October* 1888.)

The small and elegant scorpions of this genus are well represented throughout Burma, becoming less frequent in India. The largest

known species does not much exceed three inches in length and the smallest is less than two inches. The colours of all are yellow or fulvous marked with black, the former colour preponderating on the limbs and the latter on the head and body.

The genus *Isometrus* is characterized by the following structural peculiarities. The sternum is triangular; the movable finger of the mandibles is furnished with teeth on both edges; the fixed finger has teeth on the upper margin, but only one small tooth or spine on the lower edge: the serrated edges of the fingers of the chelæ are composed of short simple rows of small teeth obliquely parallel to each other, and each row furnished with a larger tooth, one on each side, at the basal end of the row; the sixth joint of the tail is furnished with a spine under the sting.

Of the eighth species found in India, Burma, and Ceylon, I have been unable to examine specimens of *I. tricarinatus*, E. Simon, and *I. basilicus*, Karsch, the former described from Pondicherry and the latter from Ceylon. It is hoped that some of the members of the Society, favourably situated for the purpose, will endeavour to procure specimens of these two species for the museum.

I subjoin a key by means of which the eight species found within the limits of British India may be identified without much trouble:

A.—Second joint of tail furnished with ten keels.

a. The last abdominal segment below, with four keels.

a'. Mandibles, cephalo-thorax and body above blackish; cheliceres and legs fulvous without marks ..... *shoplandi*.

b'. The whole animal uniform fulvous..... *tricarinatus*.

b. The last abdominal segment below, with only two keels.

c'. The upper part of the first four joints of the tail, extending on each side to the second keel, immaculate fulvous. ..... *atomarius*.

d'. The upper part of the first four joints of the tail mottled with brown ..... *varius*.

B.—Second joint of tail furnished with only eight keels.

c. The tibial joint of the 4th pair of legs furnished with a strong spine at its apex.

e'. The fingers of the chelæ not longer than the hand..... .....*basilicus.*

f'. The fingers of the chelæ much longer than the hand.....*phipsoni.*

d. The tibial joint of the 4th pair of legs not provided with a spine at its apex.

g'. Anti-ocular region black with a distinct triangular yellow patch, the apex reaching to the eyes; tail distinctly spotted.*maculatus.*

h'. Anti-ocular region entirely black; tail infuscated throughout .....*assamensis.*

The characters of *I. basilicus* and *I. tricarinatus*, of which, as before remarked, I have not been able to examine specimens, are derived from M. Simon's remarks in the "Annali del Museo Civico di Storia Naturale di Genova," vol. xx., pp. 325-372 (1884).

1. *Isometrus shoplandi*, N. Sp., fig. 7.

♀ Cephalo-thorax, body above and the mandibles deep brown tinged with fulvous; the last abdominal segment wholly fulvous on its posterior half; cheliceres, under side of cephalo-thorax with pectoral combs and the legs uniform fulvous; the femoral and genual joints of all the legs with a reddish brown spot on the outside at the apex; lower abdominal segments yellow; the under side of tail with the four keels on the first four joints and the three keels on the fifth joint with the interspaces black, except at the anterior portions of the joints, which are fulvous; remainder of the tail wholly fulvous; sting black at the tip.

Length of cephalo-thorax and abdomen	1·	inch.
,, tail	1·25	,,
,, cheliceres	·7	,,
,, hand alone	·25	,,

The cephalo-thorax is coarsely and densely granulated, distinctly emarginated in front and divided longitudinally by a deep furrow passing between the central eyes, which are about a diameter apart and seated obliquely; abdomen above coarsely granulated with the median keel well developed on 2-6 segments; 1st segment without a keel; 7th segment with an obsolete central keel and four lateral ones;

extending from the middle of the segment to the posterior edge; the first four lower abdominal segments very smooth; the fifth finely granulated, with the two central keels well marked, extending from the centre of the segment to the posterior edge; lateral keels short and interrupted; first and second joints of tail with ten very distinct keels; third with ten keels, the third on each side less defined than the others; fourth joint with eight keels; fifth with three sharp keels below, the upper part rounded, with a longitudinal central depression; sixth joint with a keel below, terminating in a rather short blunt spine, and with some ill-defined keels at the sides; sting well-curved and very sharp, about as long as the joint it is attached to; legs normal, slightly keeled; the spine of the tibial joint sharp and about a quarter the length of the metatarsus; pectoral combs long, with 22 teeth; humeral joint of cheliceres nearly smooth; cubital joint with two parallel keels above, another one below and outside, and another beneath the joint; radial joint much swollen interiorly, smooth and rounded outside, the upper side with a nearly smooth keel, the inside with some blunt spines more or less arranged in two or three rows; digital joint small and perfectly smooth, the fingers half as long again as the hand, curved inwards and rather hairy.

The male is not known: most probably it will be found to differ from the female in structure only, not in coloration; the body will be smaller and the tail proportionally longer, and the fixed finger of the cheliceres will be found to be strongly sinuated as in *I. varius*.

I. shoplandi has hitherto been found only at Palone, a village about 50 miles north of Rangoon, and at Entagaw near Pegu. I have much pleasure in naming this well-marked species after Captain F. R. Shopland, the late commander of Her Majesty's Indian Marine steamer "Enterprise," a keen naturalist, who has always assisted me greatly, especially in the numerous trips we have taken together to the Burmese lighthouses.

2. *I. tricarinatus*, E. Simon.

A remarkable species, uniformly fulvous throughout. The length of the female is given as 1·4 inches or 38 millimetres. Pondicherry.

3. *I. atomarius*, E. Simon.

Described from Minhla on the Irrawaddy river in Upper Burmah, a few miles north of the old frontier. I have procured it at Thayetmyo and also in the Tharrawaddy District north of Rangoon.

♂ Length of body, ·58 in.; of tail, 93; of cheliceres, ·72

♀ „ „ 74 „; „ 1·02; „ ·72

This species is allied to the next, *I. varius*, from which however it varies in some important particulars. In *I. atomarius* the fifth lower abdominal segment is entirely fulvous yellow, with only one black spot near the anterior edge; the upper part of the first four caudal segments, as far as the second keel on each side, is clear fulvous yellow without any marks whatever; the cubital joint of the cheliceres has merely a small dot of black at each end on the upper side, and the radial joint is marked with black only on the terminal third of its length. It is also a much smaller species than *I. varius*. The male differs from the female in having the body shorter, the tail proportionally longer, and in having the fixed finger of the hand strongly sinuated on the basal half of its length.

4. *I. varius*, C. Koch.

An extremely common species widely distributed. I have taken specimens in all parts of Burma, from Tenasserim up to Mandalay. It varies greatly in colour from bright rufous to dull brown, but I cannot find that these variations are correlated with climate, specimens from the dry region of Mandalay being fully as brightly coloured as others from Tenasserim.

♂ Length of body, ·8 in.; of tail, 1·3; of cheliceres. ·95
♀ „ „ ·95 „ ; „ 1·25; „ ·85

The male is smaller than the female, with much longer (proportionally) tail and cheliceres, and the hand is much larger with a strongly sinuated fixed finger. The coloration of the sexes is the same.

5. *I. basilicus*, Karsch.

Appears to be rare in collections, but probably common enough in Ceylon. If correctly described, this species has the curious peculiarity of having the hands of the same length or longer than the fingers, a point of structure not possessed by any other known spacies.

6. *I. phipsoni*, N. Sp., figs. 1, 2.

This species, the largest of the genus, appears to be common in Tenasserim, whence I have received numerous specimens.

Judging from the description, this species is allied to *I. messor*, E. Simon, from Java, but it is much larger, and differs moreover in the coloration of the legs and other points.

♀ General colour fulvous yellow above; the cephalo-thorax nearly black round the central eyes and in front of them up to the anterior margins, the whole thickly and coarsely granulated, with the excep-

tion of a few patches and streaks which are quite smooth ; the first six upper abdominal segments thickly granulated with prominent central keels, each segment with two clearly impressed yellow spots on the hinder margin and a sub-marginal broad stripe on each side; seventh segment with black granulations on the anterior central part, and with yellow ones elsewhere, lateral keels very distinct, mesial keel indistinct posteriorly. Legs above marbled with brown which nearly covers the fulvous yellow ground-colour, except on the terminal portions of the tibial and metatarsal joints and the whole of the tarsal which are fulvous without marks; the cephalo-thorax beneath is fulvous yellow, the pectoral combs yellow, and the first four abdominal segments shining yellow, with the posterior edges paler and duller yellow ; fifth abdominal segment dull fulvous yellow, finely granulated ; under side of legs dull fulvous yellow ; first four joints of the tail fulvous above, infuscated below ; fifth joint entirely dark brown or blackish ; sixth joint black suffused with reddish ; sting reddish yellow at base and deep red at the tip ; axillary, humeral, cubital and basal portion of the radial joints of the cheliceres fulvous, with one or two very minute brown marks in some, absent in other specimens; terminal portion of radial joint, the whole hand and the basal half of the fingers rufous brown ; terminal half of fingers fulvous yellow ; sides of the abdomen blue ; the hand is hardly as wide as the radial joint ; the two upper keels of the fifth caudal segment are sharp and strongly toothed, and there are five distinct keels on the under side of the sixth joint of the tail.

The ♂ resembes the ♀ in coloration, except that the first four abdominal segments below are deep fulvous, broadly edged posteriorly and laterally with yellow, and the fifth segment is of the same fulvous colour as the other ones and absoletely granulated. In structure it differs remarkably, having a shorter body and a longer tail ; the cheliceres are much longer, and the hand is broader than the radial joint ; the keels on the upper surface of the fifth caudal segment are rounded and absoletely granulated ; it has only one keel on the lower side of the sixth joint, and the granulations on this are absent.

In the female the length of the body is rather more than that of the first four caudal segments, whereas in the male it equals that of the first three segments.

♂ Length of body, ·95 in. ; of tail 2·2 ; of cheliceres, 1·55
♀ „ „ 1·03 „ ; „ 1·45 ; „ 1·35

I name this fine species after Mr. Herbert M. Phipson, the energetic secretary of the Society.

7. *I. maculatus*, De Geer, figs. 3, 4.

I have this species from Tavoy, Moulmein, Rangoon, Table Island (Andamans) and Bombay. It is of very wide distribution. This scorpion and the next are peculiar in not having a spine at the end of the tibial joint of the fourth pair of legs.

The male differs from the female in having a smaller body and much longer tail and cheliceres. The colour is the same in both and so is the structure.

♂ Length of body, ·75 in.; of tail, 1·75; of cheliceres, 1·4
♀ ,, ,, ·8 ,, ,, 1·05; ,, ·8

8. *I. assamensis*, N. Sp., figs. 5, 6.

From Dhubri in Assam, whence I received six specimens from my friend, Mr. O. G. Smart, of the Public Works Department. It is of much the same colour as *I. maculatus*, but is very much smaller. It may be distinguished at once by having the whole space in front of the central eyes black, the keels on the last abdominal segment obsolete; and the tail not spotted but clouded with fuscous.

Like *I. maculatus*, it wants the spine on the tibial joint of the fourth pair of legs.

The sexes are alike in colour and differ in structure by the male having a smaller body and a longer tail; the cheliceres in both sexes are of much the same size.

♂ Length of body, ·5 in.; of tail, 1·0; of cheliceres, ·55
♀ ,, ,, ·6 ,,; ,, ·85; ,, ·5

The slight difference in size in the sexes of this species separate it widely from *I. maculatus*, in which the difference is very striking.

NOTE ON SOME BRANCHING PALMS.

Communicated by Mrs. W. E. Hart.

(*Read at the Society's Meeting on 11th December*, 1888.)

To the popular mind, perhaps the most characteristic feature of the Palm family is the tall, straight, undivided stem, surmounted by its single head of leaves.

Some species, no doubt, as the edible date (*Phœnix dactylifera*), throw out a number of young plants from the parent stem at a

short distance from the ground. These can be removed without interfering with the growth of the main stem. Indeed I am told by Mr. Birdwood and other friends, who have seen this species in cultivation in Sind and other places, that the usual mode of propagation is by removing these young shoots, which, when planted, take root and enter upon an independent existence, and in time themselves throw out similar shoots.

A good specimen in Bombay is to be seen in the Elphinstone Circle Garden, close to the railings, a few feet to the left as you enter by the Western Gate. At a height of about three or four feet from the ground, from among the thick mass of adventitious rootlets which thicken the stem at its base, have sprung eight of these young shoots, radiating from the axis of the parent stem, to which four of them are still attached. The other four have been removed and planted in the Victoria Gardens, but only one seems likely to survive. Mr. Carstensen kindly showed it to me the other day in a large pot near the fern-house. When once it has properly rooted, it will probably be found to thrive quicker if planted in the open ground, for I have found that to pot young specimens of the common wild species (*Phœnix sylvestris*) greatly retards their growth.

But these young plants thrown out by the parent tree are not *branches* in the proper sense of the word. There are, however, certain species of so called "branching palms, in which the stems naturally bifurcate after growing single for some distance. Sometimes each bifurcation again divides after it has attained a certain height. Occasionally the operation is even again repeated in each of these second bifurcations.

Such is the Doum palm of Egypt (*Hyphane Thebaica*), a good specimen of which is to be seen in the Sewree cemetery, a short distance from the gate on the left of the main walk as you enter. There, among a group of these palms with dichotomous stems, which I suppose found their way to the spot in the days when the Agri-Horticultural Society of Bombay had their head-quarters in the neighbourhood, is one which repeats the bifurcations in the manner I have described.

But besides the species in which the stems *naturally* divide, there are exceptional instances of apparent *monstrosities*, in which individuals of a species ordinarily characterized by the simple stem have developed a dichotomous disposition.

A few months ago there appeared in the *Times of India* the following account of what seems to be a celebrated specimen of a branching betel-nut palm: "A famous forked palm of Cayenne is giving signs of weakness. It has been proposed to cut it down, and preserve the trunk in the Natural History Museum at Paris after being shown in the World's Fair in 1889. This remarkable tree belongs to the genus *areca*, is about 100 feet high, and divides at a height of about 30 feet, the two stems being equal in height and diameter, and flourishing and fructifying like two isolated trees The vegetable phenomenon is in a grove with some 400 other palms and shows nothing abnormal save its twin stems."

A still more curious instance is that of the wild date (*Phœnix sylvestris*) mentioned by Brandis, at p. 553 of his *Forest Flora of North-West and Central India*, as "growing in the Residency Garden at Indore, with a trunk 22 feet high to the first branch, and with 22 vertical closely packed branches." This specimen is also described according to Brandis, in the *Gardener's Chronicle* of 1874, p. 116, and our Honorary Secretary informs me that it is figured in the Agri-Horticultural Society's Journal 4, N.S. of 1875, but I have been unable to lay my hands on either of these works.

The accompanying illustration of the above mentioned tree is from a photograph obtained with the kind assistance of Mr. L. S. Newmarch. I am also informed by our Honorary Secretary, who recently visited Indore, that there are now only 12 branches, and that the tree shows no signs of having ever been cut for toddy.

Two instances of abnormal division in the stems of the common wild date (*Phœnix sylvestris*) have come under my own notice in Bombay.

One is in the compound of the bungalow belonging to the estate of the late Mr. A. G. DeGa, in which I am at present residing, on Altamont Road, Cumballa Hill. The other is in the compound of the house on the Pedder Road, formerly known as *Sea Scale*, when it was the residence of Mr. Wordsworth, but now called *Sea Gale*, and in the occupation of Mr. Nowrojee N. Wadia.

The former of these two specimens is a few yards to the north of my stable, close to the west side of Altamont Road. The tree is apparently of considerable age, and bears the marks of deep incisions for toddy. After growing in the usual way to a height of nearly 20 feet the stem has branched into four. The ramifications do not radiate from the axis of the original stem but are thrown out, so to

speak, all in the same plane. There is no thickening of the original stem at the point of junction. The branches themselves are considerably attenuated just at this point, but almost immediately assume a vertical direction, and then all attain the thickness of the main stem. They are also all of about equal height, having grown some 12 feet from the point of junction to the base of the crown of foliage. Each branch bears flowers and fruit. A sketch of this tree had been made by Miss Starling from a photograph by Capt. Shopland for the Society's Journal.

The other specimen stands about 50 yards from the compound wall on the west of the Pedder Road, but being on rather elevated ground is plainly visible from the road. The stem which in this instance also shows signs of having been tapped for toddy, has bifurcated at a height of about 12 feet from the ground. The southernmost of the two branches seems to form rather more of a right angle with the original stem at the point of junction than do any of the four branches in the other specimen. Excepting this, and the number of their branches, the two trees seems to grow in much the same manner.

I have also heard of an instance of a bifurcating cocoanut palm (*Cocos nucifera*) in the Mahim woods, but have not seen it. I have also heard of, but not seen, another instance of a bifurcating wild date (*Phœnix sylvestris*) in the jungle between Mount Nepean Road and the Malabar Hill Reservoir.

Brandis, at the page already cited, in the *Forest Flora*, speaking of the edible date (*Phœnix dactylifera*) says the branching stems are occasionally found in the Panjab, and that many palms have occasionally bifurcating stems and sometimes develope a large number of side branches. But the above are the only specific instance of abnormal branching in the simple stemmed species that I have been able to find or hear of. From them it would appear that the abnormal branching is always, if not strictly dechotomous, yet in multiples of two.* It would also appear that the branches, whatever their number, spring from the original stem at the same height. Next it would appear that they do not radiate in different directions around on the axis of the original stem. Lastly, it would appear from their being of the same length and girth that they are of equal age.

* An instance mentioned at p. 79 of *An Indian Olio* by General Burton of a *seven* branching *Palmyra*, shows the ramifications are not always dichotomous At the reading of the paper Mr. Kabraji mentioned another instance of a seven-branching cocoanut palm at Jabalpur near Naosari.

From all these facts I am inclined to infer, *first*, that these abnormal so-called "branches" are not ramifications in the strict sense of the word. That is, they are not lateral growths from a main stem which continues growing, but are divisions of the original stem itself; *secondly*, that all these divisions, whatever their number, originated simultaneously from the same cause; *thirdly*, that these causes also resulted in the disappearance of the first head of foliage which originally crowned the single stem.

The question then arises, what is the cause? This is not without an economic interest, for it is clear that if the cause be one capable of artificial application, it might be possible to double or quadruple the yield of fruit, nuts, or toddy, from a single tree.

Several possible causes suggest themselves. Stewart in his *Panjab Plants*, p. 244, as quoted by Brandis in the page already cited of his *Forest Flora*, supposes that "the branches are merely apparent, caused by seeds germinating in the axils of the petioles." Brandis, however, regards this theory as improbable. Certainly it would be difficult, on this supposition, to account for the facts above noticed of the apparent identity in age of the branches and the disappearance of the original crown of foliage.

But the abnormal branching might be due to atavism, or "throwing back" to a primeval type of ancestral palm, which naturally branched, a lineal descendant of which has survived in the down palm, or it might be an effort of evolution in the direction of development towards a branching type.

This raises a very interesting question in Darwinism with which I fear I am hardly competent to deal. The solution of it would seem to depend in a great measure on whether we are to regard the naturally branching palm as the survival of an ancient type or the development of a new one.

Judging from what we know of palæontological botany it would appear that the evolution of the dicotyledonou type from the acrogens through the cycadaceæ was already complete before the appearance of the palms. For besides their mosses, ferns, reeds, and cycades, we find in the coal measures of Great Britain, numerous remains of conifers and true exogenous trees. But it is not till the Tertiary period that there occurs any abundance of palms. From this I would infer that the palm does not come in as a link in the chain of the evolution of the dicotyledonous trees, and therefore that the branching of the palms is not to be regarded as an effort towards such evolution.

It may, however, be one in the evolution of a new type of monocotyledonous branching trees. In this sense the Doum palm would appear to be rather the forerunner of a new type than the descendant of an old one. For among the various species of fossil palms that have yet been discovered, I am not aware of one that is characterized by a branching stem. We should however remember that, owing no doubt to their softer texture, far fewer species of palms have been found than of the harder wooded dicotyledonous trees, and possibly among those which have been lost is the branching type.

Is then the abnormal branching of palms naturally single stemmed due to the efforts of individuals to develop a branching species in imitation of the Doum palm? I think not. The author of the article *Palma* in the last edition of the *Encyclopedia Britannica*, noticing the abnormal branching of palms, writes that it is "probably the result of some injury to the terminal bud at the top of the stem, in consequence of which buds sprout from below the apex." This view seems to be corroborated by most of the facts already mentioned, notably by the disappearance of the original foliage crown, by the apparent identity in age of the branches, and by the presence of incisions for toddy, at least in those Bombay specimens which I have described. These incisions, made just at the base of the crown of leaves, often result in its destruction and the death of the tree. Often however we notice merely a distortion of the single stem at the point of incision. It may well be that where the injury is greater than would merely result in a simple distortion of the axis of growth and yet not great enough to entirely destroy it, the young bud at the top of the tree divides into two or more, and hence the apparent branching of the stem at the point of injury and disappearance of the original single foliage crown.

It would therefore appear that the reduplication of the productive power of a tree could be artificially effected by the infliction of the right injury, care being of course taken to avoid such excess as would result in the death of the tree. Possibly too, if specimens of such artificially branching palms were produced in sufficiently large quantities over a sufficiently lond period and propagated by careful selection, we might in time have another species of naturally branching palms. Only in striving to arrive at this laudable result let us be careful we do not first destroy all our existing species, and go down to posterity, as the rivals in fame of the old lady who killed the goose that laid the golden eggs.

MAULED BY A PANTHER.

BY W. B. M.

I FIND from my diaries that I had killed fifty-six panthers and forty-six tigers—a total of one hundred and two felines—when I was defeated by a panther in the following manner:—

I had been camped for 14 or 15 days close to the great earthen dam of the Waghat lake, looking after my police and revenue subordinates, who had to collect and keep on the work 3,000 labourers required by the Engineering Department to secure the dam from injury during the rains, when I heard of a tiger being in the Ramsej hills, distant about ten miles. I at once despatched a tent to Tongaldhara, a small village below the hill, and sent out four or five of my police constables and the same number of sepoys to collect information of the tiger and mark him down if possible. The day after my arrival at Tongaldhara (31st May 1884), a villager came hurriedly to my tent about nine o'clock in the morning, announced that a tiger—it turned out to be a large panther—had been seen by the *paltyas* (watchers) at early dawn crossing over the hill, and that it had been satisfactorily marked down on the far side.

I started on my pony to ride round the hill, while I sent my policemen and the few beaters I could collect in Tongaldhara across it with orders to meet me at Dherrigam village.

When I arrived at Dherrigam I was pointed out the side of a hill, some 800 feet high, in which the so-called tiger was said to be marked down. This hill was crowned throughout its length with a massive natural wall of trap rock, varying from 150 to 200 feet high, having about its middle three or four deep rents or clefts forming passes from one side of the hill to the other, and through one of these the panther had been seen to enter the ravine at dawn.

Looking through my glasses I could discern 15 or 20 *paltyas* (watchers) posted in twos and threes at various commanding points on the hill side. The white head-dress or clothing of some rendering them conspicuous on the black rocks on which they sat, others easily distinguishable by their dark skins against the light bark of the tree on which they were perched, or against the yellow grass on which they squatted. It was impossible for the beast to move an inch without detection with all these fellows round the jungle. Beckoning down some of them from the hills, I enquired where the

beast was supposed to be. Those of the northern side asserted that they had seen him go into a *nalla*—dry torrent bed—on their side of the hill, and lie up in some cactus bushes (*salvi*), while those of the southern side declared he had gone down the hill and had disappeared amongst some large rocks under a clump of green and shady trees. The knowing ones of the village said that he had a lair in both places. The distance between the two points was between a quarter and a half mile, and deeming it impossible to organize a drive which would cover both, I made up my mind to drive the rocks below first, and then to drive the *nalla* above. The only thing against this arrangement was the small number of beaters, who were not more than 50, and who would have been quite lost on the extensive area to be covered. I consequently sent two police constables to neighbouring villages for more men, while I sat down to a light breakfast. After eating a hurried meal I went with an old villager to a large rock, under which the beast was said constantly to lie in the heat of the day. Nice cool quarters he had under it, but unfortunately he was not at home, so I returned to where the beaters were assembled, and was soon rejoiced at seeing about 75 more men turn up with my police constables. A consultation took place amongst all the elders of Dherrigam village, and it was finally settled that I was to take up my position in a wild fig-tree about a hundred and fifty yards beyond the rocks and clump of tree containing the lair of the animal.

An old villager, wearing a dark brown blanket, the fashionable head-dress of his caste, and affording protection to his head and shoulders from the sun, was sent with me, as he was reputed to know exactly where to place me. When I got to the tree in question I objected to get into it, as no portion that would bear my weight was five feet from the ground, and it practically afforded no protection, while it was a most awkward one to shoot from; I therefore said I would stand on the ground, where my aim would be steadier. The old fellow declared the beast's path lay directly under the tree, and the panther would pass *pote-a-kal* (under my belly) if I would only get up the fig-tree. Over-persuaded by such arguments I got astride a large horizontal branch, while my companion climbed high up the small shoots over my head, and taking my spare rifle well out of reach, ensconced himself in the green branches at the top of the tree. I so placed myself as to face the beast as he came along under the tree, as I considered it very

probable that if I did not prevail on him to stop before he came up to me he might have a pleasant few minutes' amusement with my legs dangling down to within a few feet of the ground.

The first shout of the beaters had scarcely echoed up the hill when my friend on the tree above me remarking, "There goes the tiger" pointed upward, and following the direction of his finger I saw a very fine panther one hundred and fifty or two hundred yards off trotting with long and rapid strides up the hill to my right. Sitting as I was astride a large branch it was impossible for me to turn round sufficiently, get my rifle to my shoulder, and bring it to bear on an object above and well to my right. Nevertheless I fired at him from my cramped position, and I believe I hit him, as he turned round and snapped at his hind quarters, and some *paltyas* in trees who saw him pass close declared they saw blood on his flanks. He tried to pass over the hill, but was turned by *paltyas*, and he proceeded to lie up in some rocks under trees directly below the high cliff crowning the hill. I hurried up the hill to head him, and getting the beat so arranged as to drive him towards me, I knelt on the ground, rifle in hand, directly in his road to cross over the hill.

I had not been long in position when I saw his beautiful yellow skin shine in the bright sunlight as he descended a dip in the path under the cliff, coming straight towards me. When he rose out of the dip, to my surprise, he suddenly pulled up and looked dead in our direction. I whispered to the old fellow behind me, holding my spare rifle, that it must have been the confounded dark blanket over his head that the panther had seen. He declared the blanket was not to blame, but the men above us on the rocks, and looking up I perceived, for the first time, some half-dozen beaters shewing well down to their waists above the high rocks over us. The panther then lying down broadside on in the open with his tongue hanging out, kept his head turned round in our direction showing that he distinctly saw us in spite of the bright glare of the sun. I was nearly tempted to fire at him as he was not more than 80 yards off, but a shot at a sitting animal is always a difficult one, and I dreaded putting him back on the beaters, some of whom he would have been sure to maul, if not kill. As the drive came on he quietly slipped down the hill and I went after him.

When thus following him some men in a teak-tree, hailing me, told me they had seen him sneak into some cactus bushes and long grass

close by, and that he had certainly not passed out or gone beyond. I took up a position from which I could command the small piece of jungle pointed out, and was having it driven when a police constable, Daghru, shouted from above that he had discovered a large hole with panther foot-marks going into it, and to corroborate the statement he brought me some hairs found at the entrance of the hole which, on examination, I saw were long and white, so, remarking that they looked more like hyena's than panther's hair, I told him to see if there were any yellow or black ones about. I, however, clambered up the hill after the constable, having one loaded rifle carried by the Kotwal of the village close by me. The other I unloaded, as there was some climbing and nasty ground to be got over, and from accidents I had seen, I always dreaded rifles going off when in the hands of ignorant natives. The bearer of this second weapon I told to come on as quickly as he could.

I went straight to the earth where Daghru was, and satisfied myself that the pugs of a panther distinctly led into the hole. I was then taken to a second hole about 20 or 30 yards distant, which, the villagers asserted, communicated with the first. While here, taking a pull at my drinking water and making arrangements to light a fire of grass and green leaves to smoke the brute out, in order that I might shoot him as he escaped at the other end, the police constable, Daghru, came running round in a great state of alarm and told me that two (*baghs*) panthers, had come out of his end of the earth, were simply playing the mischief amongst the beaters, and that unless I hurried round the beasts would get away.

I seized my rifle from the hands (of a native standing close by me), and ran to about as strange a scene as it was ever my lot to witness. The panther had come out of the hole with a rush amongst the beaters crowding round; many of these were in the act of bolting as hard as they could down the hill, others were lying about, having gone in the knees from funk, and fallen in the extraordinary way natives sometimes do, and the last man standing was going over backwards before the infuriated panther when I arrived.

Many seconds were not allowed me for contemplation of this scene as the panther charged straight at me. Owing to the number of beaters about—some on the ground, some picking themselves up, and some bolting—it was impossible for me to fire without the greatest risk of shooting one or two of them. I consequently had to wait until the panther was within a few feet of me, and I then

put my rifle down to his head, expecting to roll him over like a rabbit (as I had succeeded in doing on other occasions), and then place my second bullet pretty much where I pleased. To my horror there was no report when the hammer fell! The next moment the panther, with an angry roar, sprang on me. Hanging on with the claws of one fore-paw driven into my right shoulder and the other round me, he tried to get at my head and neck, but I fortunately prevented this by raising my left arm which he instantly seized in his huge mouth. I shall never forget his sharp, angry roar, the wicked look of the greenish yellow eyes within six inches of mine, the turned-back ears, his fœtid breath upon my cheek, and the feeling of his huge fangs closing to the bone through my arm above the elbow.

I endeavoured, by giving him my knee in the stomach, to make him let go. Those who have ever kicked a cat, can imagine what little effect this had. It was more like using one's knee to a foot-ball than anything else. The panther, with a roar, gave a tremendous wrench to my arm, hurled me some five paces down the side of the hill prone on my face, bringing my head in contact with a tree. Stunned and insensible, I lay some seconds on the ground, and the brute, thinking me dead, fortunately did not worry me, but, passing over me, went for the retreating police constable who had brought me into the difficulty. I remember when I came to raising my head from the ground, leaning my forehead against the tree, and smiling, with a certain feeling of grim satisfaction, when my eye caught the retreating form of the constable and the pursuing panther down the hill, and I thought the policeman's turn had come. In his precipitate flight, however, this constable went apparently also in his legs, for he fell and thus escaped a mauling.

During the scrimmage the beaters, completely losing their heads, bolted here, there, and everywhere, and neither they nor the constables made the slightest effort to drive the beast off me. The patel or head of the village, clapping his hand to his mouth, shouted at the top of his voice: "Oh, my wife is a widow, my wife is a widow," meaning, I conclude, that if I were killed an avenging but just Government would hang him, while, if I survived, in all probability I would at once dispose of him in some other but equally effectual manner.

When the panther had passed away police constable Narayan, raising me from the ground, inquired if I was much hurt. I replied that I feared I must be. He opened my coat and flannel shirt and

laid bare my gnawed arm and clawed shoulder, bleeding profusely. Feeling faint from loss of blood, I got Narayen to wrap his head-dress round and round the arm and pour cold water on it, and giving him strict injunctions to lay me flat and pour water on my head in case I fainted (natives invariably prop you up in a sitting position when you faint, and there keep you until you die!) I began the descent of the hill. I reached my little nag saddled and waiting for me, and mounting it, I simply turned her head towards home and flew over the five miles of broken country track to my camp at Tongaldhara, the other side of the hill. As I sped through the air the wet bandages on my wounds felt icy cold and refreshed me, so that I could not believe I was much hurt. The wayfarers on the road must have been astonished at the appearance of their District Magistrate and Collector as I galloped along, and, indeed, I observed that they all pulled up and looked after me as I passed bleeding from my forehead and with the arms of Narayen's coat which I had merely buttoned at the neck and his pagri flying in streamers behind me on the breeze. When I reached my tents the scene was one rather calculated to unnerve even a stronger man than me. All my servants, butler, cook, mate, dressing boy, &c., &c., gathering round, as I bathed the wounds in cold water and re-wet the bandages, and crying piteously, told me I never could recover from such deep injuries. I tried to persuade them I was all right, and as if to disprove their mournful predictions I became quite elated in spirits, and after swallowing a cup of tea, I started, with my dressing boy, in my pony trap, for Nasik. The lad driving, rattled over the ten miles of good road almost as fast as the mounted policeman I sent ahead to summon the Doctor to my house, and two hours and a half had not elapsed from the time of my mauling before I was in the hands of the Civil Surgeon of the Station.

The Doctor probed the teeth wounds in the arm and found that at the back of the arm ran right to the bone and was an inch and a half deep. The two wounds on the inner side, in or close to the biceps, were one an inch and a quarter and the other an inch deep. The claw wounds on the right shoulder were not serious, and had fortunately just missed the large artery near the collar bone, injury to which would have resulted in my bleeding to death in a very few minutes.

Carbolic acid and water lotion bandages were applied, and these my servants kept wet night and day. My head, as the Doctor feared

concussion from my symptoms, was kept deliciously cool with an eau-de-cologne and water bandage. For three or four days I continued in a very exhausted state. I was incoherent and more or less off my head. I well remember how, in my frightful dreams, the panther constantly came at me again, and how fiercely I struggled to get my hands and feet (which I imagined tied) free, and how ultimately I awoke bathed in perspiration, having got rid of my horrible nightmare. From the poisonous wounds sinuses formed which had frequently to be laid open with the lancet. On the 27th day I was out of bed and moved to Bombay to join a new appointment. One wound gave trouble longer than the others, but having been turned inside out, as theDoctor termed it, with the lancet a second time, all proceeded satisfactorily, and, thanks to the great care and attention of my medical adviser, within two months from the occurrence of the mishap, the wounds were healed up and even a sling was dispensed with.

Here a word of advice to those who, like myself, have the misfortune to be mauled. Remember that teeth and claw wounds of these large felines are poisonous, from their eating flesh and carrion, and that being punctured wounds they must be kept open at the mouth and made to granulate from below; so sure as they close over at top sinuses will form and the wound and sinuses must be laid open with the lancet. I should have been spared much pain if I had borne the above in mind, and not hurried to have the wounds closed over for me to get about.

Asked how it occurred, all I can reply is that I can't say with certainty whether a cartridge missed fire, or whether, when I hurriedly seized the rifle from the hands of the bearer I seized the unloaded one. It is possible that the village Kotwal, hearing of two panthers, and the utter rout of the beaters, lagged behind with the loaded rifle and allowed the unloaded one to come on with me. When I was mauled the rifle was knocked out of my hands, the hat off my head, and even the watch and cartridges out of my pockets, and I did not see the rifle again until I rose from my bed three weeks after the accident. It is consequently impossible for me definitely to explain the mishap, though, when I examined my rifle, I certainly found the claw-marks of the panther on my twelve-bore rifle, while I am under the impression that it was my central fire express that I loaded before commencing my ascent of the hill.

ZOOLOGICAL NOTES.

A CURIOUS INSTANCE OF FRIGHT.

In the last number of the Journal I noticed that Mr. Vidal, in his letter on "Poisonous Lizards," mentions several cases of the effects of fright on a native when under the impression that he had been bitten by some poisonous reptile. The following incident, which occurred at one of my camps, may be interesting. One evening one of my subordinates told me a coolie had been bitten by a snake; I went and examined the man, who said he had been bitten on the inside of the big toe. Careful examination, however, showed no puncture or even scratch To put the man's mind at ease I administered a large dose of brandy.

The man did not seem frightened, his chief idea being to go and kill the snake. He gradually got worse, and in a quarter of an hour he was insensible, skin cold, froth at the lips, quite rigid, and, most remarkable of all, his eyes were insensible to light. His pulse was, however, fairly steady and good. I could do nothing more for him, but one of the coolies came up and asked to say *Mantra* over him Having got permission, he took a small *lota* of water and standing quite six feet from the man began to recite, every now and then sprinkling a little water towards, but not on, the man. In ten minutes the coolie was walking about perfectly well. There is in my mind no doubt that the saying of the *Mantras* cured the man, not from any inherent efficacy in them, but simply because the man's faith in them was greater than the fear of the snake poison.

F. E DEMPSTER,
Myingyan, Upper Burmah.

26th July 1888.

A FOX EATING WHITE-ANTS (*TERMITES*).

Dr. Stewart, of the Poona Horse, who is a careful observer, writes as follows on 7th November 1888:—

"On the 5th instant, while breaking a young horse, I came upon a fox in a ditch by the side of the road. There had been rain, and he was on a white-ants' nest, from which numbers of the winged white-ants were issuing. About 40 crows were crowding round him, barely keeping 'at arm's length' and hardly afraid of him. As I came up, at a walk, he retired into a field about 20 yards, but almost immediately turned and went back. All the crows on this rose from the nest with a noise that would have alarmed most animals, but he only hesitated a moment and then ran eagerly and quickly to the nest again. I have not the slightest doubt he was eating the white-ants. I passed within four yards of the nest and saw there was no carrion of any sort on it, for the ground was bare; on the other hand his very eager manner and the position he took up on the nest, left no doubt in my mind what he was after. Had I been able to do so, I should have watched him."

It is not at all unlikely that the fox was engaged in this excellent work of destruction, as the number of birds and animals, which feed on these excellent little insects, is very large. I once saw a squirrel at Matheran scratching the red-earth off a dead tree and greedily devouring the white-ants beneath, which greatly surprised me, as I had always supposed the squirrels to be strict vegetarians.—*Editor.*

PROCEEDINGS OF THE SOCIETY.

Proceedings of the Meeting held on 6th August 1888.

The usual monthly meeting of this Society took place on Monday, the 6th August, and was largely attended. Dr. D. MacDonald presided.

The following new members were elected:—Captain W. St. John Richardson, Mr. W. S. Owen, Khan Saheb Manockjee Dhanji, Mr. G. K. Betham, Mr. Goverdhundass Khatao Mackunjee. Lieut. R. H. Light, Dr. E. H. Brown, Dr. Monks, Mr. G. A. Kittredge, and Dr. Barry.

The Honorary Secretary, Mr. H. M. Phipson, then acknowledged the following contributions to the Society's collection:—

Contributions during July.

Contribution.	Description.	Contributor.
1 Snake (alive).....	Bungarus arcuatus.....	Dr. da Gama.
Several rare Birds' Nests from the North Cachar Hills.	Palm-Roof Swift, Grey-headed Broad-Bill, Little Spider-Hunter, Mrs. Goulds' Honey Sucker, Scarlet-backed Flower Pecker, Golden headed Babbler, and Rufous-bellied Bulbul.	Mr. E. C. S. Baker, through Lieut. H. E. Barnes.
2 Snakes.....	Chersydrus granulatus and Cerberus rynchops.	Mr. W. S. Hexton.
Coral	From Red Sea.....	Dr. E. Littlewood.
A Piece of Bark Cloth	... .	Mrs. Ashdown,
1 Scaly Ant Eater.....	Manis pentadactyla	Mr. Fred. Wright.
1 Panther Cub (alive).....	Felis pardus	Do.
1 Mongoose (alive).....	Herpestes griseus	Mr. R. H. Light.
1 Chameleon (alive)	Chameleo vulgaris	Mrs. Aston.
1 Cobra (alive).....	Naga tripudians	Major Bissett.
1 Sea Snake (alive)	Enhydrina bengalensis .	Mr. H. J. Hemming.
2 Young Porcupines (alive)	Hystrix leucura	Mr. H. Barrett.
1 Black Sloth Bear (alive).	Ursus labiatus	Lieut. F. Sapte.
1 Cobra (alive).....	Naga tripudians	Mr. G. Carstensen.
1 Chameleon	Chameleo vulgaris	Dr. E. H. Brown.
3 Guinea Pigs (alive).....	Cavia cobaya	Mr. H. A. Coggan.
1 Sun Bear (alive)	Ursus malayanus from Borneo.	Sig. G. Ceccarelli, through Mr. F. Bozzoni.
1 pair Red Jungle Fowl ...	Gallus ferrugineus	Mr. W. S. Price.
Nest and Eggs	Black-capped Black Bird, White Winged Ground Thrush and Blue-breasted Water Rail.	Mr. H. M. Hewett.
1 Snake	Tropidonotus punctatus...	Mr. Lennane.

Contributions to the Library.

Birds of British-Burma (Oates), from Captain Shopland.

The International Scientists' Directory, from Dr. Dymock.

Records of the Geological Survey of India, in Exchange.

Journal of the Asiatic Society of Bengal, Vol. LVII., Part II., Nos. 1, 2, in Exchange.

Verhandhingen der Zoologisch Botanischen.

Gersellschaft in Wien. XXXVIII. Band. Quartal. I. II.

Miss La Touche exhibited a fine specimen of the Hunting Leopard (*Felis jubata*) or *Chita*, which she had reared from a cub. The animal, which was perfectly tame, was much admired by all present. Mr. E L. Barton also exhibited two tigers' heads mounted by him for members of the Society since last meeting.

THE PROPOSED ZOOLOGICAL GARDEN.

The Honorary Secretary, Mr. H. M. Phipson, stated that since the last meeting of the Society no reply had been received from Government as to the site asked for, and that the Committee was, therefore, not yet in a position to lay before the members for their approval any definite proposals with regard to the contemplated Zoological Garden. With a view, however, to test the popularity of the scheme, a list had been started in the local newspapers of persons who would be willing to support the project by becoming life-members of the Society on payment of Rs. 150, on the understanding that they would be relieved of all further payments, and be entitled to a free entrance to the Garden to themselves and two friends. The *Times of India* had most generously headed the list with a subscription of Rs. 500, and the amount had in less than one month risen to Rs. 51,150. (Cheers.) T. E. Lord and Lady Reay had added their names to the list as well as their Royal Highnesses the Duke and Duchess of Connaught, H. H. the Rao of Cutch, Sir Dinshaw Manockjee Petit and another well-known Parsee gentleman had promised Rs. 1,000 each, and it was proposed that donors of such amounts should be elected patrons of the Society with all the privileges of life-members, and also that cages built with the money should be named after the donors.

The Honorary Secretary further stated that no reply had been received from the Municipal Commissioner to the proposals made by the Committee, but that the subject had been discussed at several meetings of the Town Council and Corporation. In the opinion of the Committee the site asked for *was the only one in Bombay on which a popular and successful Zoological Garden and Aquarium could be made.* The land had for many years been partially occupied by cattle keepers, and was at present in a most insanitary condition. A Zoological Garden, if properly laid out and well kept, could not possibly be a source of annoyance to any one. In support of this assertion the Honorary Secretary drew the attention of those present to the largest collection of wild animals in the world that belonged to the Zoological Society of London, which may now be said to be in the heart of the Metropolis. No complaints had ever been made of any annoyance arising from the London Zoological Garden, and the best evidence of this was the fact that the houses on the north and north-east of Regent's Park, facing the Menagerie, command very high rents. Promises of specimens had been received from all parts of the country, and the Committee were confident that if the desired site were obtained, one of the most picturesque gardens in the world could be made thereon, which would be a credit to Bombay, and furnish the inhabitants with a constant source of amusement and instruction. (Applause.)

Mr. Reginald Gilbert then read an interesting paper, entitled :—"Notes on Sambhur and Sambhur Stalking," which will be found in another part of this number.

PROCEEDINGS OF THE MEETING HELD ON 6TH SEPTEMBER.

The usual monthly meeting of the members of this Society took place on Monday, the 6th September, Mr. G. Carsensen presiding.

The following new members were elected :—

Mr. E. Hadyn, Dr. Boyd, Dr. Sinclair, Mr. W. B. Mulock, C.S., Mr. C. J. Maltby, Captain G. Budgen, Mr. A. R. M. Simkins, Mr. F. G. Richardson, Brigadier-General La Touche, Mr. H. E. M. James, C.S., and Mr. B. W. Blood.

The Rev. A. K. Nairnes was elected an honorary member of the Society.

Mr. H. M. Phipson, the Honorary Secretary, then acknowledged the following contributions to the Society's collections :—

CONTRIBUTIONS DURING AUGUST.

Contribntions.	Description.	Contributor.
A Collection of Lizards and Bats.	From Burmah	Marchese G. Doria.
2 Hares (alive)	Lepus nigricollis	Mr. W. Stephens.
1 Cashmere Mouse-Hare ..	Lagomys sp.	Mr. H. Littledale.
Skin. Nest and Eggs of White-browed Bunting.	Emberiza cia	Do.
Skull of Black-necked Stork.	Mycteria australis	Do.
2 Eggs of Chukor Partridge.	Caccabis chukor	Do.
2 Eggs of Marsh Tern	Hydrochelidon indica	Do.
1 Egg of Himalayan Snow Cock.	*Tetraogallus* himalayensis.	Do.
3 Snake's Skins.....	From Natal	Miss Lloyd.
1 Cobra (alive)	Naga tripudians	Mr. G Carstensen.
8 Sea Snakes (alive)	Enhydrina bengalensis. Hydrophis diadema.	Mr. Vincent McCarthy thro' Capt. Falle.
1 Purple Coot (alive).....	Porphyris poliocephalus ...	Mr. W. Sbipp.
2 Monkey-mouthed Sharks	Stegostoma tigrinum	Mr. W. W. Barr.
1 Porcupine's Skull	Hystrix leucura	Do.
1 Snake	Tropidonotns punctatus ...	Mr. Lemâne.
A quantity of Turtles' Eggs	Chelonia virgata	Dr. D. A. D'Monte.
1 Mongoose Skull	Herpestes griseus	Mr. C. J. Malthy.
1 Tailor Bird (alive)	Orthotomns sutorius	Sergeant-Major Webb.
1 Flamingo (alive)	Phœnicopterus antiquorum.	Mr. J. Littlewood.
1 Chameleon	Chameleo vulgaris	Mr. R. H. Madan.
1 Monitor (alive)	Varanus dracæna	Mr Barrett.
1 Pair Oryx Horns	From Africa	Brig.-Genl. La Touche.
1 Pair Khudoo Horns	Do.	Do
1 Python (alive)	Python reticulatus	Capt. C. H. Bingham.
1 Indian Antelope's Head ..	A Doe with horns	Major J. H. Yule.

CONTRIBUTIONS TO THE LIBRARY.

Catalogue of the Frogs, Toads, and Cæcilians of S. India (Edgar Thurston).....	From the Author
Proceedings of the Linnæan Soc. of N. S. Wales, Vol. III., Part I.	In exchange.
Astor : or Sport and Travel in Cashmere (H. Liscomb)...	Mr. T. J. Bennett
Journal of Comparative Medicine and Surgery. Vol. IX. No. 3...	In exchange.
Annali del Museo Civico de Genova, Series II., Vols. I to V.	Marchese G. Doria
Proceedings of the Royal Society of Edinburgh, 1883 to 1887.....	In exchange.
Knapsack Manual for Sportsmen in the Field. (Ward.)	Mr. J. A. Murray
Plants and Drugs of Sind. (Murray.).....	Do.
Economic Products of India	Do.
List of Indian Economic Products.....	Do.
Catalogue of the Exhibits in the Indian Section of the Fisheries Exhibition.....	Do.
The Birds of Southern Afghanistan. (Swinhoe)	Do.
The Vertebrate Zoology of Persia. (Murray)	Do.
Fauna of British India. Mammalia (Blanford.)..... ...	From the Author.

MINOR CONTRIBUTIONS FROM

Mr. Lambert, Mr. F. H. Coutts, Mr. H. W. Barrow, Mr. H. Bromley, Mr. W. F. Jardine, Mr. E. S. Cooper, Mr. B. W. Blood, Mr. J. W. Scott.

THE PROPOSED ZOOLOGICAL GARDEN.

Mr. H. M. Phipson stated that the Committee were still waiting for a reply to the letter they addressed to Government on the 15th June last with reference to the proposed site for a Zoological Garden. In the meanwhile about Rs. 54,000 had been subscribed by the members of the Society and those who were willing to join in the event of the scheme being carried out.

PROCEEDINGS OF THE MEETING HELD ON 1ST OCTOBER 1888.

THE usual monthly meeting of the above Society was held on Monday, the 1st October 1888, Dr. D. MacDonald presiding. The following new members were elected:—Mr. J. McLeod Campbell, Lieutenant C. R. Boniface, and Mr. P. R. Mehta.

Mr. H. M. Phipson, the Honorary Secretary, then acknowledged the following contributions to the Society's collections:—

CONTRIBUTIONS DURING SEPTEMBER.

Contributions.	Description.	Contributor.
1 Hawk (alive)	Astur badius	Mr. Chubildas Lulloobhoy
2 Florican's Eggs & 2 Rain Quail's Eggs.	From Kharaghora.....	Mr. E. P. Close.
3 Snakes (alive)	Silybura macrolepis.....	Mr. E. Butcher.
4 Cobras (alive)	Naga tripudians	M. P. R. Metha.
2 Snakes (alive)	Eryx johnii and Ptyas mucosus.	Do.
1 Monitor.....	Varanus dracæna	Mr. R. P. Smith
1 Porcupine's Skull	Hystrix leucura	Mr. W. W. Barr.
2 Young Manuras	Paradoxurus musanga	Mr. W. S. Owen.
1 Monitor	Varanus dracæna	Mr. F. H. Coutts.
1 Large Turtle.....	Chelonia Viridis	Dr. de Monte.
6 Snakes	From Mhow	Lieut. R. H. Light.
1 Snake (alive)	Eryx johnii	Capt. J. B. R. Butler.
1 Manura (alive)	Paradoxurus musanga	Dr. Gonsalves.
3 Pieces of Flexible Sandstone.	From Rewari	Major Bissett.
A number of Insects and Lizards.	From Natal	Miss Lloyd.
1 Monkey (alive)	Macacus radiatus	Mr. P. E. Myer.

MINOR CONTRIBUTIONS FROM

Mrs. Simkins, Mr. Kaikobad C. Dinshaw, Mr. C. B. Lynch, Mr. J. W. Scott, Mr. W. Gaye, Mr. J. O'Connell, Mr. E. T. Ansell, Rev. R. Stothert, Mr. W. Bushby, Mr. W. W. Squires, and Mr. E. P. Close.

CONTRIBUTIONS TO THE LIBRARY.

Catalogue of the Moths of India (Coles and Swinhoe)..... . .....From the Authors
Records of Geological Survey of India... ....In exchange.
Rough Notes on Travel and Sport in Cashmere and Little Thibet...From the Author.
Proceedings and Transactions of the Royal Dublin Society, Vol. V.,
Nos. 7 and 8. Vol. VI., Nos. 1 and 2..... In exchange.

Mr. E. L. Barton exhibited a large boar's head mounted by himself, which was much admired.

Mr. E. H. Aitken then read a paper entitled "The Natural History of a Voyage from Liverpool to Bombay," which will be found in this number.

PROCEEDINGS OF THE MEETING HELD ON 11TH DECEMBER 1888.

The usual monthly meeting of the members of this Society took place on Tuesday, the 11th December, Dr. Lisboa presiding.

The following new members were elected :—The Earl of Scarborough, the Hon'ble Mr. Justice Bayley, H. H. Maharaja of Rutlam, H. H. Samat Singjee, Miss Ada Brooke, Lieut. F. W. Wodehouse, Dr. Crofts, Mr. F. Reddie, Mr. John Bristed, Mr. W. H. Bushby, Mr. Dorab J. Tata, Mr. Erasmus Beynon, Mr. T. R. Fernandes, Dr. Banks, Mr. W. Leedamur, Mr. R M. Betham, B. S. C., Mr. A. D. Younghusband, C. S., Dr. J. P. Greany, M.D., Mr. R. Bateman Smyth, C. E , Mr. Camulsey Premjee, Mr. R. E. Candy C. S., Mr. Framjee Nusserwanjee, Col. H. de P. Renwick, Mr. M. C. Leckie, Mr. Bomanjee Dinshaw Petit, Mr. R. B. Stewart, C. S., Mr. Geo. E. Pilcher, Mr. J. Muir-Mackenzie, C.S., Mr. R. J. Rustomjee, Mr. L. H. Spence, Mr. G. McCorkell, C. S., Mr. Jamsetjee Cursetjee Powalla, Mr. G. Cotton, Mr. Alex Menesse, Mr. H. W. Uloth, Mr. T. C. H. White, Mr. Alex McKenzie, Mr. W. H. Middleton, Mr. J. Westall, Dr. R. Manser, Mr. M. H. Scott, C.S., Mr. N. M. Patell, and Mr. E. J. Ebden, C. S.

Mr. H. M. Phipson, the Honorary Secretary, then acknowledged the following contributions to the Society's collection :—

CONTRIBUTIONS DURING OCTOBER AND NOVEMBER.

Contributions.	Description.	Contributor.
Set of Cock-fighting implements.	Used by the natives in the Kurnool District.	Mr. H. M. Hewitt.
1 Malabar Red Squirrel	Sciurus malabariens	Mr. T. Thornburn.
2 Squirrels (alive)	Sciurus palmarum	Mr. A. J. Lennane.
A quantity of Insects	From Raipore, C. P.	Mr. J. A. Betham.
Do. do.	From Surat	Mr. W. S. Hexton.
A quantity of Insects and Reptiles.	From Bushire	Mr. D. J. Wilson.
1 Snake	Silybura macrolepis	Mr. G. W. Roughton.
1 Night Jar (alive)	Caprimulgus asiaticus ...	Mr. R. J. Elliott.
1 Dusky-hornet Owl	Bubo coromandus (from Baroda.)	Mr. J. M. Henry.
1 Cat Fish (57 lbs.)	Caught in the Bhima	Dr. Stewart.
1 Nicobar Pigeon.....	Callanas nicobarica	Capt. Carpenter, R.N.
1 Krait (alive)	Bungarus arcuatus	Mr. H. Littledale.
Skin and Skull of Jungle Cat	Felis chaus	Mr. D. George.
1 Large Black Sand Snake (alive).	Erix johnii	Mr. P. R. Mehta.
1 Yellow-Breasted Ground Thrush (alive).	Pitta bengalensis.....	Capt. Shopland.
1 Indian Bee-Eater (alive) ..	Merops viridis	Mr. T. Thornburn.
1 Pit-Viper	Trimeresurus annamalensis.	Miss LaTouche.
4 Snakes.....	Tropidonotus quinquantiatus. Tropidonotus plumbicolor, Lycodon aulicus, and Ptyas mucosus.	Mr. G. W. Roughton.

Contribution.	Description.	Contributor.
1 Manura (alive)	Paradoxurus musanga ...	Mr. H. Barrett.
1 Chameleon (alive)	Chameleo vulgaris	Mr. N. S. Symons.
1 Monkey (alive)	Macacus silenus	Mr. F. L. Charles, C.S.
1 Aviary	(Sundry birds)	Do.
1 Snake	Daboia elegans	Mr. Justice Jardine.
1 Flamingo	Phœnicopterus antiquorum.	Dr. Boccarro.
1 Sea Horse	Hippocampus sp.	Capt. Macaulay.
1 Snake	Typhlops porrectus	Mr. James Moore.
1 Skull of Albatross	Diomedea sp.	Mr. Jas. Mitchell.
1 Chameleon (alive).....	Chameleo vulgaris	Capt. H. D. Rosseter.
1 Snake	Daboia elegans	Mr. F. Steers.
A collection of Shells and Insects.	From Fiji	Mr. E. Wimbridge.
1 Pair of Lemurs (alive)...	Lemur mongoz	Mrs. McClelland.
1 Cotton Teal	Nettopus coromandelianus	Mr. Prideaux.
2 White-Eyed Pochards ...	Aythya nyroca	
2 Snakes	Tropidonotus plumbicolor	Bridg.-Genl. LaTouche.
	Passerita mycterizans ...	
1 Pair of Loris (alive) ...	Loris gracilis	By exchange.
1 Pair of African Love Birds (alive).	Psittacus sp.....	Mr. Tytler.

MINOR CONTRIBUTIONS FROM

Colonel Westmacott, Colonel Hunter, Mr. Tytler, Mr. Trevor Smith, Miss LaTouche, Mr. E. L. Butcher, Dr. Munday, Mrs. M. C. Turner, and Major Babington Peile.

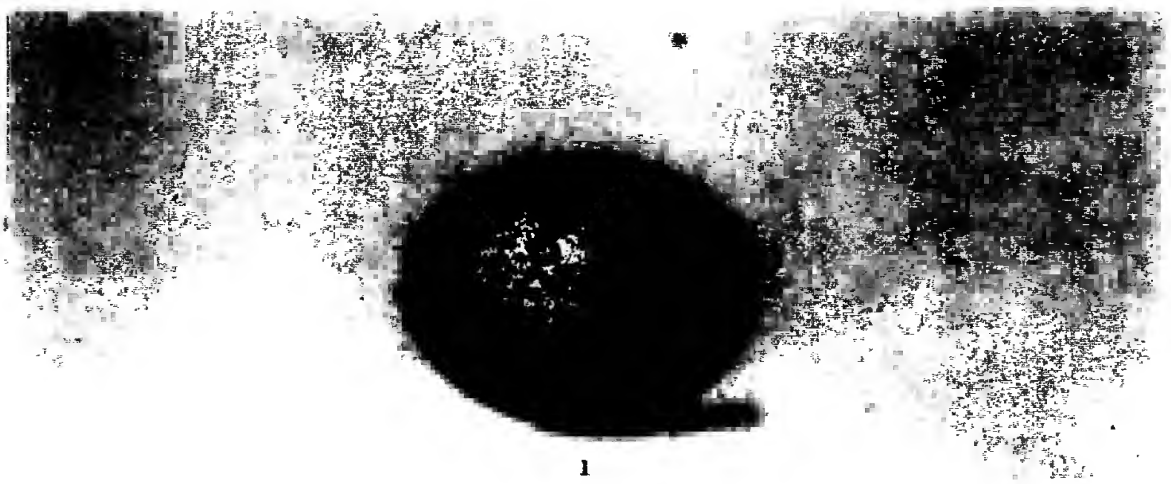
EXHIBITS. &c.

The Hon'ble Mr. Justice Birdwood exhibited various specimens of rare plants from Mount Abu.

The Honorary Secretary exhibited some specimens of the Amphioxus—the lowest form of vertebrate life—which had been received from the Zoological Station at Naples through Mr. W. F. Sinclair, C. S.

The Honorary Secretary also read some interesting zoological notes by Dr. Stewart of the Poona Horse, and by Mr. F. E. Dempster.

Mr. W. E. Hart then read a paper, communicated by Mrs. W. E. Hart, entitled "Notes on some Branching Palms," which will be found elsewhere in this number.



1

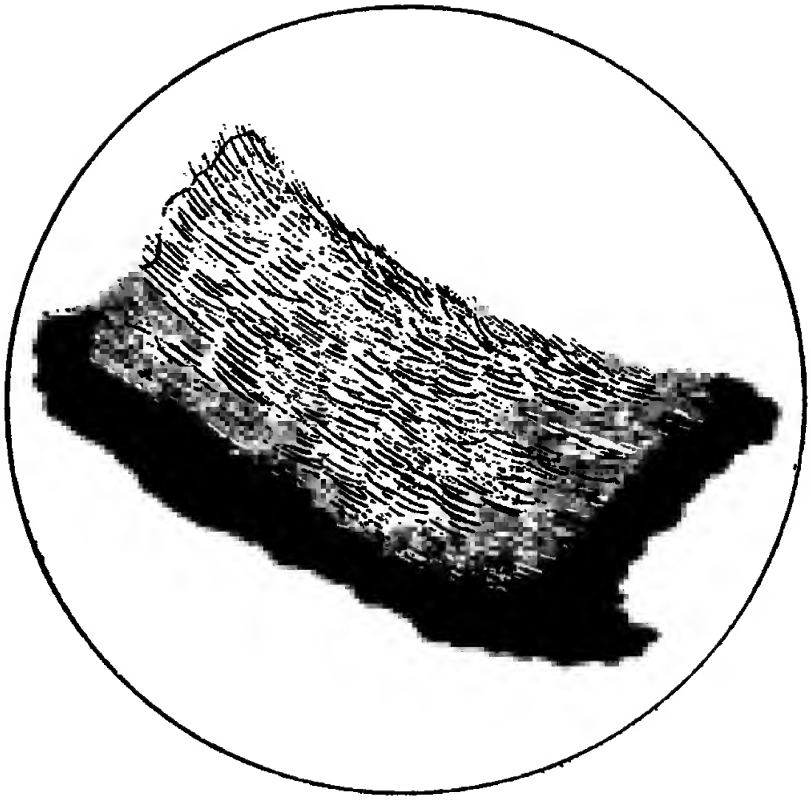
2.

3.

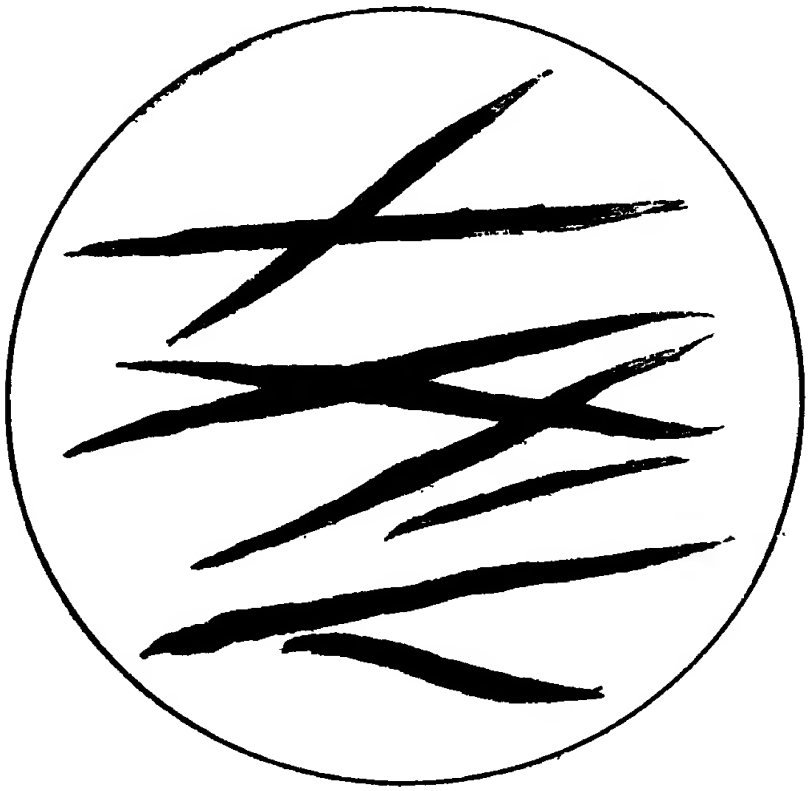
4.

1–3. ELANUS CÆRULEUS, Desf
The Black-winged Kite

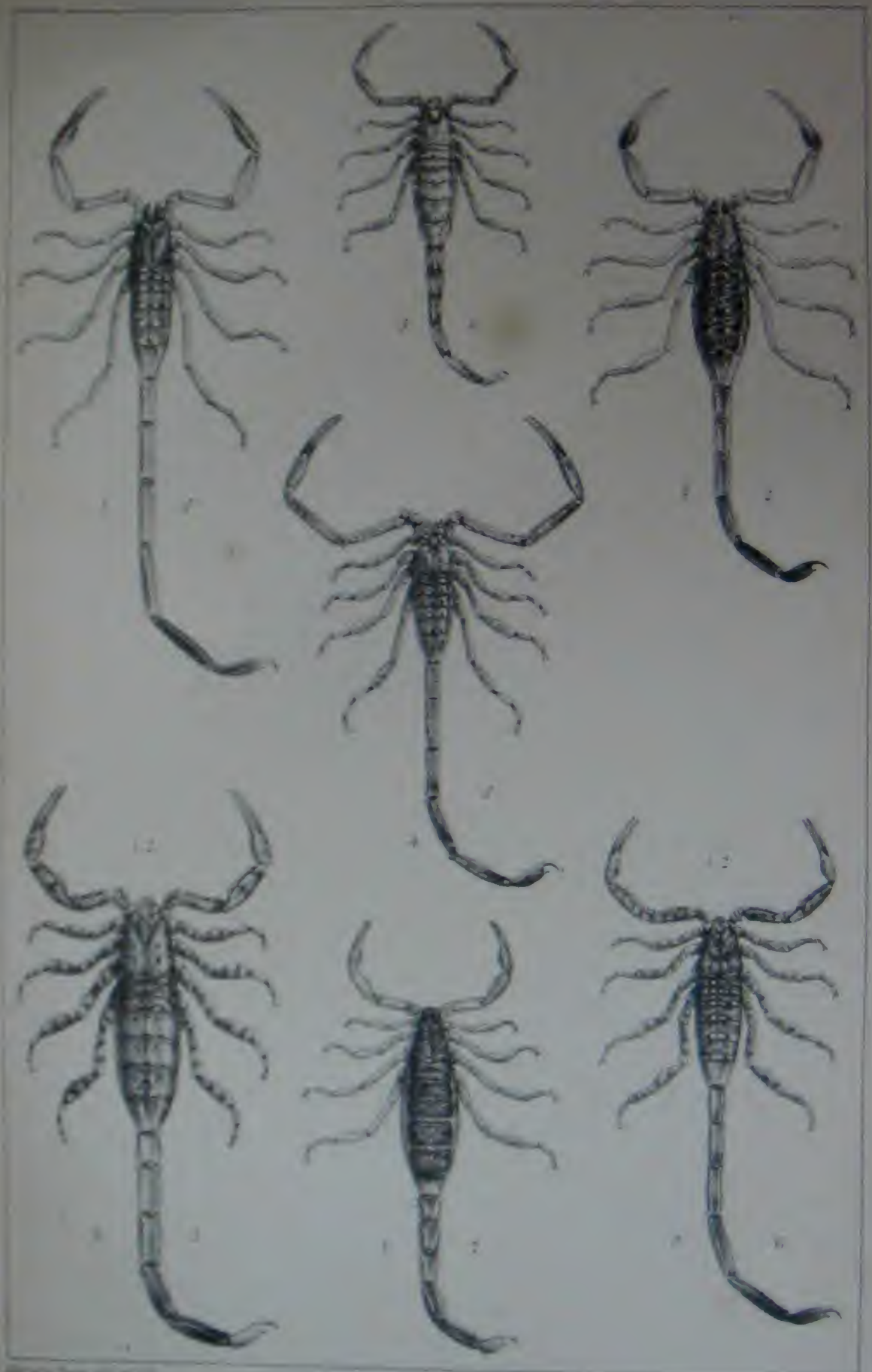
4. SPILORNIS MELANOTIS, Jerd.
The Lesser Harrier Eagle.



BARK of the LIGH TREE (SCHIMA WALLICHII) showing the Liber Cells—(slightly magnified.)



LIBER CELL of the bark of SCHIMA WALLICHII—(magnified 30 times.)



1, 2 I. phipsoni *3, 4 I. maculatus*
5, 6 I. semimarmoreus *7 I. shepherdi*

A BRANCHING DATE PALM (*Phœnix Sylvestris*)
IN THE RESIDENCY GROUNDS, LAHORE.
(*From a Photograph supplied by*

A BRANCHING DATE PALM (*Phœnix Sylvestris*)
GROWING ON [illegible]